E. C. No. 530

ESTIMATES COMMITTEE (1967-68)

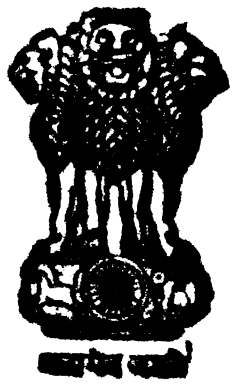
THIRTY-SEVENTH REPORT

(FOURTH LOK SABHA)

MINISTRY OF FOOD, AGRICULTURE, COMMUNITY DEVELOPMENT AND COOPERATION

(DEPARTMENT OF AGRICULTURE)

Central Inland Fisheries Research Institute, Barrackpore



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TO

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(1967-68)

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Shri K. D. Chatterjee—*Under Secretary.*

INTRODUCTION

I, the Chairman, Estimates Committee, having been authorised by the Committee to submit the Report on their behalf, present this Thirty-seventh Report on the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture)—Central Inland Fisheries Research Institute, Barrackpore.

2. The Committee took evidence of the representatives of the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) and the Central Inland Fisheries Research Institute, Barrackpore on the 6th November, 1967. The Committee wish to express their thanks to the Secretary, Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture), Director, Central Inland Fisheries Research Institute, Barrackpore and other officers of the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture) for placing before them the material and information they wanted in connection with the examination of the estimates.

3. They also wish to express their thanks to Shri Kurwath Damodaran, Vice-Chairman of the Marine Products Export Promotion Council, Ernakulam; Shri R. Madhavan Nayar, Ex-President, Seafood Canners and Freezers' Association of India, Cochin, and Dr. N. K. Panikkar, Director National Institute of Oceanography, Council of Scientific and Industrial Research, New Delhi for giving evidence and making valuable suggestions to the Committee.

4. The Committee also wish to thank Shri T. Muthukannappan, Member, Central Board of Fisheries, Dr. S. B. Setna, Managing Director, New India Fisheries Ltd., Bombay; and Kerala Fisheries Corporation Ltd., Ernakulam for furnishing Memoranda to the Committee.

5. The Report was considered and adopted by the Committee on the 29th January, 1968.

6. A statement showing the analysis of recommendations contained in the Report is also appended to the Report (Appendix XII).

P. VENKATASUBBAIAH,
Chairman.
Estimates Committee.

NEW DELHI;
February 24, 1968.
Phalguna 5, 1889 (*Saka*).

CHAPTER I

ORGANISATION

A. Introductory

(i) *Genesis*

1.1. As a source of food, fisheries stand almost at par with animal husbandry for providing animal protein requirements of our people. Recent estimates of nutritional requirements of an average Indian suggest an intake of 50 to 60 grams of protein and an energy equivalent of 2,000 to 2,200 calories. Of this protein requirement again, it is considered necessary to have animal protein to the extent of 15 to 20 grams at least. The requirements of fish protein at the rate of two ounces a day per adult amount to 7.2 million metric tons of fish based on a population estimate of 298.4 million.

1.2. The fish production in the United States has been of the order of 3 million tons, Peru 7 million tons, and Japan seven million tons annually. Production in India has fluctuated between one to 1.5 million tons in recent years. Production of fish per hectare in India is also very low; it is 6 Kg. per hectare as against 40 Kg. per hectare in U.S.S.R.

1.3. In view of the rapidly increasing population and the urgent necessity of improving and increasing food supply in the country, exploitation and development of fisheries has been engaging the serious attention of the Government since the advent of Independence.

1.4. Realising that no large scale programme of development was possible without the solid foundation of scientific research, the Government of India established in 1947 a Central Inland Fisheries Research Station (now Institute) at Calcutta to conduct scientific investigations for a proper appraisal of the inland fisheries resources of the country and to evolve suitable methods directed towards their proper development, management and conservation.

1.5. The Institute is located at Barrackpore on the left bank of the river Hooghly and is housed in its own building, covering an area of 5.2 hectares.

1.6. Till September, 1967 the Institute functioned under the direct control of the Ministry of Food, Agriculture, Community Development and Cooperation (Department of Agriculture). With effect from 1st October, 1967, the administrative control of the Institute

has been transferred to the Indian Council of Agricultural Research excluding the items of work indicated below:—

(i) Exploratory Fishing in Sunderbans estuaries.

(ii) Brackish water fish farming in lower Sunderbans; and

(iii) Inland Fisheries Training Section which imparts training to candidates mainly sponsored by the States for Junior Fisheries Officers.

(ii) *Objectives*

1.7. The object of the Institute is to study and elucidate the scientific principles which can be applied in the utilisation of all available inland waters for maximum production of fish for food in the country. This entails evolving suitable fish cultural techniques, inevstigations on the biology of important food fishes, studies on hydrology and ecology of different types of fishery waters, researches on the fish populations in natural waters like rivers, lakes, estauaries, etc. and fisheries management problems concerning both fresh and brackishwater fisheries.

1.8. It has been stated that the impact of the results of some of the research schemes on rural pisciculture and fish production has been immense. For example, the nursery management practices developed by the Institute have increased considerably spawn and fry survival in nurseries; the successful technique of induced breeding in major carps and exotic fishes evolved at this Institute has made available a powerful instrument for the production of large quantities of pure seed of desirable cultivable species of fishes; the location of important fish seed collection centres in various river systems of the country has enabled the respective regions to meet the local demands for fish seed to appreciable extent bringing in regional self sufficiency; the important methods of control of equatic weeds have given encouraging field results; control methods for certain epidemic diseases of fishes have been of great value in preventing or considerably reducing fish mortality in ponds and tanks and techniques evolved on the correction of deficiencies of soils will result in enhanced production of fish.

1.9. It has been further stated that the knowledge of the disposition of fisheries in important estarine systems has made it possible to draw up projects for rational exploitation of these areas, which should result in improved fish production.

1.10. The Committee note the objectives of the Institute and the efforts made so far to realise the same. They are glad that significant advances have been made in the research on pisciculture and

fish production. Being the premier research institution in the country devoted to inland fiesheries, the Institute has a great responsibility in evolving new methods and techniques for fish culture and suggesting means for increasing fish production in available inland waters. Alongside the researches on fish cultural techniques, investigations on the biology of important fisheries, etc. there is an imperative need for disseminating the results of researches to the fish farmers who want to take up fisheries as a profession. The Committee hope that the Institute would keep this objective in view while carrying on research work.

B. Organisation

(i) *Headquarters*

1.11. The work of the Institute is divided into four main Sections, namely, Pond Culture, Estuarine, Riverine and Reservoirs. In addition, there are three ancillary Units, namely, Fish Pathology, Cold-water Fisheries Unit and Library and Documentation; a training course and administrative and accounts sections.

1.12. The Pond Culture Section has been concentrating its attention towards evolving suitable fish culture techniques, increasing production of fish seed through pituitary harmone administration, studying the efficiacy and economics of different types of fertilisers for increasing the productivity of nurseries and fish ponds and control of aquatic weeds in culture fishery waters.

1.13. The Estuarine Section has been conducting investigations on the magnitude of the fish population in the estuaries and the factors affecting the fluctuations of fisheries in them and observation and experimental studies to develop scientific methods of fish culture in brackishwater ponds.

1.14. The Riverine Section at Allahabad has been engaged in the investigations on the fish and fisheries of the Ganga, Narbada and Krishna-Godavari river systems, location of breeding grounds of carps and spawn collection centres in various river systems and study of the extent of damage caused to the fisheries by the industrial affluents and domestic sewage and their remedial measures.

1.15. The Lacustrine Section at Tungabhadra Dam has been conducting studies on the hydrobiological aspects and the fish populations of the Tungabhadra Reservoir with a view to formulating suitable measures of fisheries development in the reservoirs and river basins.

1.16. The Fish Pathology Unit conducts investigations on the parasites and diseases of fishes and control of the same.

1.17. The Coldwater Fisheries Unit is engaged on the fisheries of hill streams as well as Trout culture.

1.18. The Library and Documentation Section is responsible for the maintenance and improvement of the Library and compilation, publication, etc. of research reports, bulletins, etc.

1.19. Broadly, the scientific work of the entire Institute can be divided into two aspects: (a) Culture Fisheries Research and (b) Capture Fisheries Research.

1.20. In Culture Fisheries Research where the work relates to the culture of fish in impoundments, inevstigations are mainly experimental in nature and are conducted at certain farms at the disposal of this Institute in Orissa. For Brackishwater Fish Culture studies, some studies were conducted in Orissa and a farm is being constructed at Kakdwip. The work of the Fish Culture Sub-station is grouped into several problems, such as Pond Culture Techniques, Induced Breeding of Fish, Exotic Fish Culture and Breeding Control of aquatic weeds, Soil Chemistry, etc. Each problem is under the charge of either a Junior Research Officer or a Senior Research Officer, who is responsible for the execution of the work assigned to him and for the day-to-day guidance of the work of investigators under his charge.

1.21. In Capture Fisheries much of the data are collected in the field and since the results of investigations have to relate to the commercial fisheries, data are drawn largely from the commercial fishing units. Since the validity of the conclusions drawn and the results obtained largely depend on the adequacy of the samples observed, it has become necessary to collect elaborate statistics in Capture Fisheries studies.

1.22. An Organisational Chart of the Institute is given in Appendix I.

(ii) *Sub-stations*

1.23. The four main Divisions of the Institute are (i) Pond Culture Division; (ii) Riverine Division; (iii) Lacustrine Division; and (iv) Estuarine Division. For administrative purposes these Divisions are designated as Sub-stations.

1.24. The Pond Culture Division has its Headquarters at Cuttack which is known as Fresh Water Fish Culture Research Sub-station. This Sub-Station has under its charge the Fish Farm at Cuttack,

the Chemistry and Weed Control Unit at Calcutta and the Experimental Fish Farm (proposed) at Panna.

1.25. The Riverine Division has its Headquarters at Allahabad which is known as the Riverine Fisheries Research Sub-Station. This Sub-Station has under its charge the (i) Krishna Godavari Unit (Rajahmundri) and (ii) Hilsa Fisheries Unit (Bhagalpur). This Sub-Station also looks after the fisheries of Ganga River System.

1.26. The Lacustrine Division has its Sub-Station at Konar Dam (Bihar). This Sub-Station has under its charge (i) Tank Fisheries Research Unit (Bangalore) and (ii) a small reservoir unit at Rewa. This Sub-Station also looks after the Big Reservoirs Unit (Konar Dam and Tungabhadra Dam).

1.27. The Estuarine Division has its Sub-Station at Barrackpore known as the Estuarine Fisheries Research Sub-Station. This Sub-Station has under its charge three units, namely (i) Pulicat Unit (Madras State); (ii) Estuarine Fisheries Research Unit (Calcutta); and (iii) Estuarine Fisheries Research Unit (Kakdwip, West Bengal).

1.28. Out of the four Sub-Stations, three Sub-Stations, namely, the Riverine, Estuarine and Lacustrine have under them Survey Centres which are located at Selected points in the riverine, estuarine or lacustrine environments. These Survey Centres are engaged in collecting elaborate statistics in capture fisheries studies. A chart showing the names and location of the various Sub-Stations, Units and Farms is given in Appendix II.

1.29. The Committee note that although the administrative control of the Central Inland Fisheries Research Institute has been transferred to the Indian Council of Agricultural Research with effect from 1st October, 1967, exploratory fishing in Sundarbans estuaries, brackish water fishing farm in lower Sundarbans and Inland Fisheries Training Section, which were hitherto dealt with in the Institute, have not been transferred to the Indian Council of Agricultural Research. In view of the fact that brackish water fish culture can become a very major industry if properly developed, the importance of the exploratory fishing and brackish water fish farming started in the Sundarbans areas can hardly be over-emphasised. The Committee would, therefore, like to be assured that the work already done in exploratory fishing in Sundarbans estuaries and in setting up the brackish water fish farm in Kakdwip would continue to be dealt with by some Central agency so that they receive the attention they deserve.

CHAPTER II

ADMINISTRATION

A. Earlier Review

2.1. The progress of a research institute is directly related to the availability of persons in adequate numbers with requisite skill. As and when the problems multiply requiring urgent solution, the requirements of individuals with more advanced and specialised training and of scientifically trained workers increase. The pattern of staffing is, however, conditioned by the availability of resources of the country as a whole. Need, therefore, arises of a careful assessment of personnel requirements in relation to the projects in hand and also of fuller utilisation of the available man power.

2.2. The staff strength of Central Inland Fisheries Research Institute which was set up in 1947, following Col. R. B. Seymour Sewell's recommendations, had been reviewed twice. In 1954 the Fisheries Research Committee, under the chairmanship of Dr. B. N. Chopra, the then Fisheries Development Adviser to the Government of India, had made the following observations in regard to Central Research Stations, which included the Central Fisheries Research Institute (then a Station) at Barrackpore:

"In reviewing the work of the Central Stations, we have carefully examined the staff and equipment position in relation to their existing programmes. Although, according to the report of Col. R. B. Seymour Sewell, on the basis of which these Stations were set up, a large staff for each of the Stations had been proposed, only a small number of posts was actually sanctioned on the establishment of the Stations in 1947. These posts were considered to be the barest minimum for the implementation of only a part of the programme suggested by Col. Sewell. Many of the sanctioned posts remained unfilled for a time and were subsequently retrenched as a measure of economy. A small number of additional posts was sanctioned in connection with the First Five Year Plan, but long delays have taken place in filling them. The position at present, therefore, is that, though both the Stations have comprehensive programmes of work, the staff available to them is far adequate. The result of this has been that either

the implementation of some of the items of programme has not been taken up at all, or only work on items requiring small staff has been taken in hand.

The Committee is, therefore, of the opinion that both the Central Fisheries Research Stations have been under-staffed for the execution of their existing sanctioned programmes of work. The only exception that, in the opinion of the Committee, can be made is in connection with the post of Research Assistant for Fishery Engineering at the Inland Fisheries Research Station. As stated in another Section of the report, there is at present insufficient work for the incumbent of this post, which may, therefore, be abolished."

2.3. The Fisheries Research Committee recommended the sanction of additional scientific posts for the different projects of the Station (now Institute). They also recommended the sanction of the post of an Administrative Officer to assist the head of the Central Inland Fisheries Research Station in the discharge of his administrative duties.

2.4. In March 1961, Prof. H. S. Swingle of the Rockefeller Foundation reported on the activities of the Central Inland Fisheries Research Station (now Institute). Extracts from the recommendations made by Dr. Swingle in regard to staff are reproduced below:—

"1. It is observed that people who have specialised in particular fields have quite often been transferred to other posts in order to give them an earned promotion. This in my opinion should not be done. Whenever an Officer, who has specialised in any branch of fishery science has earned promotions, the promotion should be given in the same field of research in which he is working instead of dislocating his research and losing his valuable experience.

2. The Chief Research Officer has been forced to use an undue portion of his time in the operation of the Fisheries Training Course. It is necessary for the effective administration of the Station to relieve him of most of this work by appointing a competent Senior Scientist to be in charge of the Training Course.

3. It is observed that there are a number of cases wherein there is considerable lapse of time between a technical post being created or falling vacant, and the time when

a person is appointed to it. This necessarily retards the progress of research. Vacant technical posts should be filled as expeditiously as possible. Unless the staff for the Third Plan research is recruited early in the period it will not be possible to achieve the objective goals for research.

4. While the Library is fairly well equipped both with books and journals, there is no Librarian attached to the Library. In order to provide maximum Library facilities to the research staff, the Library should have a qualified Librarian and also necessary documentation staff to provide the required information to the research staff.

5. An Editor with necessary staff should be provided in the Fisheries Division of the Ministry to prepare all papers for publication either in the Journals or in bulletin form and to relieve the Chief Research Officers in charge of Inland and Marine Sections of much of this duty."

2.5. Since the Report of the Fisheries Research Committee and Professor Swingle's recommendations, the staff strength of the Institute has been augmented. The posts of an Administrative Officer, the Scientific Librarian as well as a Chief Training Superintendent, besides other staff, have been created. Statements showing the number of scientific teaching, administrative and other technical and non-technical posts as on 1st April, 1965, 1st April, 1966 and 1st April, 1967, in the Institute are given in Appendix III. It may be observed therefrom that during the last three years, the staff strength of the Institute has remained more or less constant. While there were 169 scientific posts as on 1st April, 1965, the number has gone to 170 as on 1st April, 1967. The only additional post created is that of a Froglegs Research Development Officer.

B. Assessment of Staff Strength

2.6. The Committee desired to know the procedure followed for the assessment of the staff strength of the Institute. It has been stated by the Ministry that posts in the Institute have been sanctioned according to specific technical requirements of the various research projects and their magnitude. Before new posts are sanctioned by the competent authorities, the prevailing staff pattern is studied and taken into consideration. The staff strength is reviewed every year by the Director of the Institute and the proposal for additional posts are scrutinised by the Ministry.

2.7. It has been stated by the representative of the Ministry during evidence that "the assessment of the staff strength of the Institute was made recently at the beginning of this year. We went by the principle that all the existing posts in the Institute should be fully utilised. At the same time, we recognised the fact that there were certain areas in which there were deficiencies. It was decided by us that we should maintain the strength of the Institute and not add to it except in a few categories. For instance, we felt that there was a specific need for engineers to deal with pond construction. So, we created a few posts of engineers for this purpose. Then we also felt that there was a need for specialists."

2.8. It has been further stated that "for the number of problems that the Institute had taken up, the staff were not only fully utilised but they did their best."

2.9. The Committee are glad to note that the Director of the Institute conducts an annual review of the staff strength of the Institute. The Committee would, however, like to suggest that, besides an annual review by the Director, there should be separate review every year of the staffing pattern of the Institute by the Standing Research Committee of the Ministry or the appropriate committee of the Indian Council of Agricultural Research. That Committee should not only examine to what extent the available resources of the Institute have been utilised to carry out the projects already entrusted to it, but also assess the need for additional posts in the Institute in the context of new research programmes proposed to be undertaken by it. The Committee while reviewing the research programmes should also locate the deficiencies in the various Divisions and Section of the Institute and suggest suitable remedial measures.

C. Vacant Posts

2.10. The Committee have also been informed that as on 7th September, 1967 out of 531 posts (permanent and temporary created by the Ministry) 106 posts of various categories were lying vacant. These included some posts like those of Deputy Director lying vacant since 20th January, 1964. Senior Research Officers (2 posts) lying vacant since 17th December, 1964 and 6th July, 1966, Assistant Research Officers (3 posts), lying vacant since 1964; Research Assistants Survey Assistants (Selection Grades) (5 posts) lying vacant since 1964 and 1965; Research Assistants (ordinary Grade) (17 posts) lying vacant since 1963, etc. Besides, some posts of Fishermen, Boat Driver, Boatmen, Sweeper, etc. were lying vacant since 1962 and later periods.

2.11. A statement showing the designation, scale of pay, reasons for not filling up the posts, etc. in respect of some of the posts lying vacant is given in Appendix IV.

2.12. During the course of evidence, the representative of the Ministry has stated that in the case of scientific posts for which higher qualifications were prescribed, the reasons for delay in the recruitment has been mainly their inability to obtain persons with suitable qualifications. He has further stated:

> "this difficulty has been felt in all the scientific posts. This was one of the reasons for giving Indian Council of Agricultural Research complete responsibility for recruiting their own staff. Now that this responsibility has gone to Indian Council of Agricultural Research we expect that the problem will be solved subject of course to availability of technical personnel with the requisite qualifications. The Indian Council of Agricultural Research have got their own Boards at two levels according to the nature of the post; and the recruitment there has been so far fairly prompt. But there also we come across certain difficulties. We are trying to amend the rules in order to give a right of review at a higher level, may be in the Indian Council of Agricultural Research itself, because various allegations were made against them that the right person was not chosen and so on. So there also we have to allow for a certain amount of review or revision but subject to their own autonomy."

2.13. Another reason that has been adduced for the non-fulfilment of vacant posts is the inadequacy of pay-scales which, it is stated, has created difficulties in attracting suitable candidates of required qualifications.

2.14. Asked to state the steps taken to revise the pay-scales in appropriate cases, the representative of the Ministry has admitted that it has not been possible for the Ministry to revise the pay-scales in such a manner as would attract the requisite quality of persons. The existing pay-scales were fixed some time back on the recommendations of the Central Pay Commission and these had continued. He further stated:

> "For some years, now as you are aware, we have had a ban on the revision of pay-scales. We have been conscious of the fact that it has not been possible for us to obtain suitable persons with requisite qualifications against these pay-scales. Now, when we find that there is a very strong

case for such revision, we take up the matter. As you know, revision cannot be made lightly in these matters because of the repercussions that will ensure. There are scientific posts not only in the Agriculture Department of the Central Government but also in other Departments of the Government of India and also in State Governments. So, any steps we take to revise the pay-scales of staff has implications all over the country."

2.15. Yet another reason advanced by the Ministry for non-fulfilment of the vacant posts is the difficulties in filling up posts reserved for departmental candidates. In this connection the representative of the Ministry has stated in evidence:

"There is a promotion quota for all the senior posts. The promotion quota selections are made by the departmental promotion committees from amongst those who are to be pushed up for promotion. Sometimes the departmental promotion committee does not find anybody qualified for promotion. But the post cannot be filled up except by promotion. About the post of Research Assistants and so on, the candidates have to be sought from the Employment Exchange and then through advertisement. We have been finding that we cannot fill up these."

2.16. As regards the post of Deputy Director (Scale Rs. 1100-50-1400) which was lying vacant since 20th January, 1964, the representative of the Ministry has stated in evidence that the post was created in November, 1961 but the incumbent of the post left the Institute in January, 1964. A requisition was sent to the Union Public Service Commission some time in 1964 for filling up the post. The Union Public Service Commission recommended a candidate who, however, did not possess the requisite qualification. The matter was thereupon taken up with the Union Public Service Commission who advised that the recruitment rules should be suitably amended. Towards the end of 1965, the question of Indian Council of Agricultural Research taking over the administration of the Research Institutes came up for consideration and it was decided that the matter should be kept pending so that, when the Indian Council of Agricultural Research took over the administration of the Central Inland Fisheries Research Institute, they could select their own man for the post of the Deputy Director. As however, no decision was then reached in the matter of Indian Council of Agricultural Research taking over the administration of the Central Inland Fisheries Research Institute and some delay was apprehended, the Ministry took action to get the vacant post filled up. In August, 1966, the recruitment rules were

finalised. In April, 1967, the clearance of the Ministry of Finance for the filling up of the vacant post was sought and in May 1967, the Director of the Institute was advised to take necessary action for filling up the post.

2.17. Asked to state the circumstances in which the Union Public Service Commission selected a person who did not possess the requisite qualifications the representative of the Ministry has stated in evidence: "It was an omission on our part. We did not provide for research qualifications in the first instance. It was therefore that we were advised by the Union Public Service Commission to amend the recruitment rules."

2.18. The Committee are surprised to note that against 531 sanctioned posts, as many as 106 posts of all categories, i.e. 20 per cent, were vacant on 7-9-1967. The Committee regret that despite the observations of two reviewing teams—the Chopra Committee (1954) and Prof. Swingle (1961)—that considerable delays took place in filling up vacant posts, Government did not consider it necessary to tackle the problem effectively and take suitable remedial measures. While the Committee are inclined to accept the Ministry's contention that staff has done useful work, they have no hesitation in saying that their output would have been larger in physical terms had all the vacant posts been filled up. While the reasons for the large number of posts remaining vacant might be diverse, their effect on the efficiency of the Institute must be cumulative. The Committee apprehended that unless quick and energetic steps are taken to fill up the vacant posts, the execution of the projects taken up by the Institute would be seriously hampered. The Committee appreciate the difficulties of the Ministry in filling up some scientific posts with suitable personnel on account of unattractive pay-scales attached to them. They, however, feel that this is a matter which should have been known to the Ministry when they planned their programmes of work requiring the services of competent technical personnel. Steps should have been taken to obtain necessary financial sanction to revise the pay scales in appropriate cases so as to attract persons with requisite qualifications.

2.19. Now that the Central Inland Fisheries Research Institute has come under the control of the Indian Council of Agricultural Research, the Committee hope that that organisation would take note of the present position and adopt suitable remedial measures in this direction.

2.20. The Committee are unhappy to note that suitable departmental candidates were sometimes not forthcoming to fill up promotional quota and as such there was delay in filling up some of

the posts. In the opinion of the Committee, this only shows a lacuna in the training arrangements in the Institute. The Institute should so plan their work and train up their personnel that at each level there is a second rung of the qualified scientists who should be in a position to come up and man the senior scientific posts as and when they fall vacant.

2.21. The Committee are also unhappy about the inordinate delay in filling up the post of Deputy Director which has remained vacant since January, 1964. They fail to see why requisite qualifications for this post were not laid down when a requisition was sent to the Union Public Service Commission in 1964. The Committee would urge that, before a new post is actually sanctioned, care should be taken to spell out in detail the qualifications and the experiences which a candidate for the same is expected to possess. While sending requisitions to the Union Public Service Commission for filling up the vacant posts, full particulars about the qualifications and research experience etc. required of the candidates should be sent simultaneously. It should also be ensured that no post remains vacant for more than six months and, if necessary, arrangements should be made to fill up the vacant posts on an ad hoc basis, so that research work is not handicapped.

2.22. The Committee would also suggest that the Ministry may examine the causes of delay in filling up such vacant posts of Classes III and IV staff as Care-taker, Engine Driver, Launch Driver, Laboratory Boy, Fisherman, Boat Driver, Boatman, Sweeper, etc. which are normally filled through Employment Exchanges. In case such candidates are not forthcoming from the Employment Exchanges, no time should be lost in recruiting the same from the open market.

D. Temporary Staff

2.23. A statement showing the number of temporary staff in the Central Inland Fisheries Research Institute is given in Appendix V. It will be seen from the statement that some cases of confirmation of Research Officers (Junior) and Assistant Research Officers are pending with the Ministry. Thirty-six posts of Research Assistant, eleven posts of Survey Assistant and five posts of Junior Survey Assistant are still temporary and the incumbants cannot be confirmed unless the posts are converted into permanent ones. There are some other posts like those of Dock-Hand, Driver, Stenographer, Junior Clerk, Laboratory Boy, Fieldman, Peon, Watchman, Fishermen, Boatman, Sweeper and Mali which are still temporary.

2.24. The Committee were informed during the course of evidence by the representative of the Ministry that the "Scheme staff are temporary, but in the process they get trained and they are absorbed as more and more permanent posts are created." They were further assured that although the staff were temporary, they would never lose their job and after gaining experience while working in a temporary capacity they would be absorbed as and when vacancies arose or permanent posts were created.

2.25. The Committee are not happy about the continuance of a large number of temporary posts some of which were created as early as 1961. Apart from the deleterious effect the temporary nature of a post has on the pensionary rights of a worker, the quality of research is adversely affected inasmuch as a temporary employee would be more preoccupied with the search for a secure job to the detriment of research.

2.26. The Committee have already dealt with this problem in para 99 of their Seventy-Fifth Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Council of Agricultural Research. They hope that the Council would consider the cases of temporary posts in the Central Inland Fisheries Research Institute in the light of the recommendation made in their Seventy-Fifth Report.

E. Ratio between Scientific, Teaching and other Staff

2.27. In Appendix III, a statement showing the answer of scientific, teaching, administrative and other technical, non-technical posts, as on 1-4-1965, has been furnished. The break-up of 524* posts shown in the Appendix is as given below:—

Scientific	—	169
Teaching	—	4
Administrative	—	64
Other Technical	—	86
Other non-technical (Class IV)	—	201
Total	—	524

2.28. The Committee note that among the category of other technical posts are included such persons as photographer, artist, computer, librarian, scientific assistant, driver, mechanic, carpenter, etc. It

*In a letter dt. the 27th October, 1967 received from the Central Inland Fisheries Research Institute, addressed to the Ministry of Food and Agriculture it has been stated that the sanctioned posts of the Institute come to 531. This includes 106 posts which are vacant.

is obvious that these functionaries, do not undertake research or teaching work. Taking the teaching staff in the category of scientific personnel, the percentage of scientific staff in the Institute comes to 33. As against this, the percentage of non-scientific staff is 67. The Committee feel that there is an imbalance in the staffing pattern of the Institute inasmuch as there is a preponderance of administrative staff as compared to scientific staff. It is desirable to lay down a correct ratio between the administrative staff and the research staff not only in this Institute but in all Central Research Institutes dealing with fisheries.

F. Model Constitution

2.29. The general principles which should govern the internal organisation of all scientific institutions and laboratories, as laid down by the Scientific Advisory Committee of the Cabinet, vide Cabinet Secretariat letter No. 84/13/CF-64 dated the 16th April, 1964, relating to the Model Constitution, are quoted below:—

"(i) It should be recognised that scientific work is the primary objective of every institution and laboratory concerned with scientific research and that administration is only ancillary to it. The Head of every such institution and laboratory should be a scientist of appropriate calibres particularly in the case of an institution mainly devoted to research, the Head of the institution should be a scientist who has distinguished himself in research. The purpose of purely administrative officers in such institutions should be to relieve the scientists of routine administrative work; but it must be clearly emphasised that the final decision should always rest with the scientist whom the administrative officers are there to assist.

(ii) Each institution and laboratory concerned with scientific research should have a Governing Council of about 7 members which should be the highest executive body of the institution. The Head of the institution or Director should be a member of the Governing Council.

(iii) The role of the Governing Council is to consider and approve the programmes of the institution within the scope of the prescribed objectives of the institution and within the scope of its budget, and to see that they are implemented. The Governing Council should scrutinise plans for development, consider, approve and operate the budget; and make the appointments.

(iv) There should be a clear provision for the delegation of powers from the Governing Council to the Director and through him, or indirectly, to other members of the staff or to Committees. Appointments and promotions upto a certain level, deputations, sanction of leave, etc., in respect of staff should be taken care of under delegated powers. The appointment of appropriate Committees of members of the staff is important for the smooth and effective functioning of the institution. Such committees could look after the library, the workshop, laboratory stores, etc.

(v) Every institution should have qualified accountants, who are also qualified auditors, whose business it is to anticipate difficulties, assist in resolving them and help the Director to devise procedures which will enable the work of the institution to be carried forward smoothly and effectively."

2.30. The Committee would suggest that the Central Inland Fisheries Research Institute and the Indian Council of Agricultural Research, to which the Institute is now transferred, should carefully consider the general principles laid down by the Scientific Advisory Committee of the Cabinet while deciding the administrative pattern of the Institute. It should be ensured that the Institute is staffed with proper and scientific personnel, there is clear delegation of powers and that scientists are provided with proper administrative personnel to relieve them of routine administrative work. The Committee would also suggest that the question of setting up of a Governing Council for this Institute on the lines of the general principles laid down by the Scientific Advisory Committee of the Cabinet should be considered and the Estimates Committee informed in due course about the action taken in the matter.

G. Transfer of Staff

2.31. In his Research Evaluation Report (1961) on the Central Inland Fisheries Research Station, Prof. H. S. Swingle of the Rock feller Foundation, US.A., had observed "that people who have specialised in particular fields have quite often been transferred to other posts in order to give them an earned promotion. This in my opinion should not be done. Whenever an officer, who has specialised in any branch of fishery science has barred promotions, the promotion should be given in the same field of research in which he is working instead of dislocating his research and losing his valuable experience."

2.32. During the course of evidence the representative of the Ministry has stated that the principle has generally been accepted. There were however, difficulties in implementing the same inasmuch as the revision of the pay-scales had been held up because of the ban on increasing pay-scales. He has further stated "Unless it is translated into financial rules and cadre rules, more acceptance of principle does not help, we want those rules to be changed. Indian Council of Agricultural Research as well as we are involved, it being the administrative department. The matter is now pending discussion with the concerned departments, particularly Finance."

2.33. The fact that the chances of promotion to higher posts or higher scales for scientific personnel are less in Research Institutes has already been highlighted by the Committee in their 75th Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Council of Agricultural Research. The Committee would reiterate the recommendations made in para 91 of their Report and suggest that the matter may be pursued vigorously.

H. Designation of Officer-in-Charge of Sub-Stations

2.34. The Committee have been informed that three senior Research Officers who are of the same rank and in the same scale of pay, are functioning in the Pond Culture Sub-Station. Two of them are posted at Cuttack and the third one is at Panna. The seniormost Officer of the Sub-Station is designated as the Officer-in-Charge of the Sub-Station.

2.35. The Committee desired to know whether the presence of two officers of identical rank working in the same sub-station was likely to lead to administrative difficulties. The representative of the Ministry has stated in evidence:

> "These three officers are no doubt of equal rank, but one of them is the officer-in-charge who has to run the administration of the Centre. This is commonly the practice in medical colleges where one professor is made the Principal . . . Each one has got his own speciality. In that, they are supreme, nobody can interfere with their work, subject to the Director at the Centre controlling their technical work. But some administrative work has to be done at each centre, accounts have to be kept, bills have to be drawn, etc. All this is done by the senior-most officer, in addition to his research work.

2.36. As regards the desirability of providing administrative officers to the Heads of Sub-Stations of the Institute, the representative of the Ministry stated that the administrative duties which they had to do were so few that it would not justify the appointment of administrative officers in Sub-Stations. He, however, admitted that the present arrangement under which the senior-most Research Officer had to perform a certain amount of administrative work in addition to scientific duties, "does mean a certain amount of departure from his scientific work. We will have another look into it."

2.37. The Committee feel that the presence of two or more officers of identical rank at the same Sub-Station and one of them being designated as the Officer-in-Charge-cum-Senior Research Officer is likely to lead to administrative difficulties. They, therefore, recommend that the designation of the Senior Research Officer, who also looks after the administration of a Sub-Station, should be suitably changed. The Committee also feel that the Head of the Sub-Station, who has to undertake research work, should not be burdened with administrative duties. They suggest that the question of providing suitable administrative assistance to the Head of each of the Sub-Stations may be considered.

I. Incentives for Meritorious Work

2.38. Professor Swingle in his report (1961) has observed:

> **"The Central Inland Fisheries Research Station, Sub-Stations and Units have been very capable organised and administered for effective research. It was especially good to find that even junior officers were given the responsibility of conducting individual research on important problems. This aids in developing a capable research staff."**

2.39. The Committee understand that there is scheme of merit promotions and advance increments in some of the research institutes on the agricultural side, namely, Indian Agricultural Research Institute, Central Potato Research Institute and the Central Rice Research Institute. Detailed instructions governing the scheme of merit promotions and advance increments have already been issued by Government to the institute concerned.

2.40. The Committee would recommend the extension of the scheme of merit promotions and advance increments to the Central Institutes on the Fisheries side, if not already done, so that such of the members of the staff as have done outstanding work are suitably rewarded.

CHAPTER III

RESEARCH

A. Fisheries Research in India

3.1. The Government of India by their Resolution No. F.9-14/J3-Fy, dated the 5th February, 1954 appointed an *ad hoc* Fisheries Committee under Dr. B. N. Chopra, the then Fisheries Development Adviser, as Chairman, to review, *inter alia*, the progress of fisheries research carried out by the Central Fisheries Research Stations, in particular and the country in general. In their report the Fisheries Research Committee has noted that earlier attention paid to fisheries was mainly from the point of view of exploitation of this natural wealth. Departments of Fisheries were established during the early part of this century in the provinces of Madras and Bengal; this example was followed by certain Indian States and Provinces which found fisheries to be a valuable source of revenue. Scientific study of the resources supporting the fisheries did not form part of the programmes of most fishery Departments.

3.2. The Government of Madras was probably the first to recognise the need for scientific investigations of firsheries, as they were confronted with the problem of large-scale fluctuations in the fishery for the oil sardine on the West Coast of India. In this Province, investigations were begun on the sardine fisheries and related marine problems. Soon after the first World War, the Marine Biological Station at West Bill, Calicut, was opened in 1921.

3.3. During subsequent years, other centres for fisheries research were established in various parts of India. The progress has been somewhat uneven, because fisheries received varying emphasis in the development programmes of the different Provinces. Until recently, no staff exclusively for fisheries research existed in most States, with the exception of a small group of workers of the Madras Fisheries Department. They undertook investigations on the sardine fisheries of the West Coast of India, plankton, pearl and chank fisheries and very preliminary studies on other marine fisheries.

3.4. The next phase in the development of fisheries research corresponds to a period of growing interest in the subject at the

universities and some of the State Fisheries Departments, who undertook research schemes subsidized by the Indian (then Imperial) Council of Agricultural Research. The subjects taken up for study included life-histories, bionomics and growth of carps, fish culture, fish eggs and larvae, and technological problems connected with the preservation of fish. The schemes were mainly on short-range problems but in the absence of adequate facilities at most of the centres of work, the progress achieved by these schemes was not appreciable. Most of the fishery schemes subsidized by the Indian Council of Agricultural Research have now been discontinued.

3.5. The position in 1944, when the post-war development schemes were being formulated by the Government of India, was that scientific studies on Indian fisheries were confined to a few States, notably Madras, where, in addition to work on marine fisheries already referred to, researches on fresh water fisheries had been started. Some aspects of technological research were being investigated at the Departments of Fisheries of Bengal, Bombay, Baroda and Travancore. Apart from the schemes financed by the Indian Council of Agricultural Research, work on marine biological problems and on the biology of fishes was being actively pursued in the Universities of Madras and Travancore. Fisheries research in the strict sense of the term had not formed part of the programme of any institution. Owing to the importance of the subject, the Central Department of Agriculture decided, in 1945, to start a Fisheries Research Institute. A reference to the genesis of the Central Inland Fisheries Research Station (now Institute) has already been made in the preceding Chapter.

3.6. The Ad hoc Fisheries Research Committee assessed the work of the Central Inland Fisheries Research Station (now Institute) and submitted its report after visiting the Institute and discussion with the research staff.

3.7. Extracts from the Report of the Fisheries Research Committee (1954) relating to the review of the work done and its general recommendations may be seen at Appendix VI.

3.8. The Committee understand that the Government of India have accepted all the recommendations made by the Fisheries Research Committee for implementation. Most of the States have also agreed to implement the recommendations.

B. Standing Fisheries Research Committee

3.9. Realising the need to coordinate fisheries research carried out by the Central and State Governments and the Universities in order to avoid duplication of effort and to direct the research programmes for solving problems connected with fisheries development activities in the country, the Government of India set up in 1955 a Standing Fisheries Research Committee of which the Joint Commissioner (Fisheries), Government of India is the Chairman and the Central and State Directors of Fisheries and the selected University Professors are members.

3.10. The Standing Fisheries Research Committee held its first sitting on the 7th April, 1955 and since then it has met thirteen times. Details of the meetings held by the Standing Fisheries Research Committee are given below:—

First Sitting (New Delhi), 7th April, 1955.

Second Sitting (Mandapam Camp), 28th April, 1956.

Third Sitting (Calcutta), 16-17th January, 1957.

Fourth Sitting (Hyderabad), 28-29th October, 1957.

Fifth Sitting (Srinagar), 3rd, 4th & 5th July, 1958.

Sixth Sitting (Trivandrum), 2nd, 3rd & 4th April, 1959.

Seventh Sitting (Delhi), 28th December, 1959.

Eighth Sitting (Puri), 13th-14th December, 1960.

Ninth Sitting (Veraval), 14th November, 1961.

Tenth Sitting (Simla), 27th May, 1963.

Eleventh Sitting (Hyderabad), 5th, 6th & 7th June, 1964.

Twelfth Sitting (Mandapam Camp), 14-15th May, 1965.

Thirteenth Sitting (Madras), 31st October & 1st November, 1966.

3.11. It is noted from the proceedings of the Standing Fisheries Research Committee that discussions cover a wide ground on different aspects of inland and marine fisheries. Problems are freely discussed and suggestions are offered wherever necessary. It is also noted that a suggestion was made at the Conference held at Srinagar in July, 1958, that for better coordination, regional meetings should be held and that members from a particular region may be coopted

for the purpose. Such meetings may be arranged immediately before the Standing Fisheries Research Committee meetings.

3.12. The Committee commend the steps taken by the Standing Fisheries Research Committee for coordination of fisheries research in the country. They suggest that the proceedings of the Standing Fisheries Research Committee should be published and made available to all fisheries research institutes in the Centre and in the States as well as to universities which impart teaching in fisheries and allied sciences. The Committee also suggest that the Standing Fisheries Research Committee should hold their sittings at important fishing centres of the country so as to bring the representatives of the industry into closer contact with research workers. The Committee feel that for better coordination the regional committees should meet frequently and discuss problems of common interest and a report of discussions held at such meetings should be made available to the Standing Fisheries Research Committee.

C. Research Projects in the Institute

3.13. The Committee have been informed that the research work of the Central Inland Fisheries Research Institute has now been thoroughly re-oriented in order to cover investigations on immediate and short range specific research projects, concurrently laying down priorities, the solution of which is apt to lead to quick fisheries development and increased fish production.

3.14. During the years 1965-66, 1966-67 and 1967-68 the Institute had taken up 21, 18 and 20 Projects respectively. Of the 20 Projects taken up for execution during 1967-68, 6 Projects relate to Investigation on Culture fisheries, 2 to Investigation on exotic fisheries and 12 are Ancillary Projects. Details of the 20 Projects are given below:—

Name of the Project	Investigating Authority	Financial exp. involved on estt.	Benefits likely to accure
1	2	3	4
		Rs.	
1. Optimum per hectare production of fry, fingerlings and fish in culture fishery operations.	Pond Culture Sub-Station	3,801	Fuller utilisation of water area, increased supply of fish seed, greater production of fish and increased returns to the farmers.

1	2	3	4
2. Study of induced fish breeding technique.	Pond Culture Sub-Station	2,298	Supplementing natural collections, facilitating seed availability in areas not having natural seed resources.
3. Fishery investigations in reservoirs and studies on the dynamics of their fish populations.	Reservoir Sub-Station.	10,520	Realisation of optimum sustainable catch from reservoir.
4. Riverine fish seed investigations and study of population structure and behaviour of spawn.	Riverine Sub-Station	19,710	Opening of new spawn collection centres which will augment the present spawn collections.
5. Exploratory investigations in Sunderbans.	Transferred from the Institute.	..	..
6. Freshwater prawn Culture.	Pond Culture Sub-Station	..	Utilisation of prawn frig available from natural sources. Increased returns to farmers as prawn bring better returns.
7. Murel and other air-breathing fish culture.	Pond culture Sub-Station	13,561	This will meet the consumer preference for murels etc. in certain parts of the country like Punjab, A.P., etc. Swampy areas can be reclaimed for their culture.
8. Brackishwater prawn culture in mixed farming.	Estuarine Sub-Station	16,806	This will facilitate utilisation of the brackishwater resources which are mostly lying fallow. This will also lead to considerable increase in fish production.
9. Selective breeding and hybridisation in conjunction with induced breeding.	Pond Culture Sub-Section	798	This will enable introduction of new varieties of fish having better qualities of growth and taste.
10. Research on designing fish farms.	Not yet in operation.	6,848	This will help in reduction of Capital costs involved in construction of fish farms.
11. Study of economics in fishery investigations and development projects.	Do.	3,787	The impact of new techniques developed on fish production will be evaluated critically to determine their applicability in the field

1	2	3	4
		Rs.	
12. Exotic fish culture (for the present only grass and silver carps).	Pond Culture Sub-Station	2,596	This will enable proper utilisation of the available fish food in ponds and will also enrich the variety which will bring best returns to the farmers.
13. Coldwater fish culture.	Coldwater Fisheries Unit	798	Fuller utilisation of the production potential of hill streams.
14. Riverine and Estuarine fish catch statistics.	Rivarine & Estuarine Sub-Stations	15,508	This will indicate depletion of resource in time and give the warning for conservation measures to be taken. It will also help in proper management of the water.
15. Fish Pathology . . .	Pathology Unit	2,000	This will help in reducing fish mortality.
16. Weed Control . . .	Pond Culture Sub-Station	1,000	Control of weeds will increase fish production as weeds deplete the protein food which would otherwise be available to fish.
17. Frog farming. . .	Do.	1,440	If the techniques of frog farming can be developed to make the operations economical productive frog farms can be set up.
18. Sewage fed fisheries . .	Not vet in operation.	3,284	This will enable utilisation of sewage water for fish production as sewage water which is highly fertile can be a source for manuring of tanks.
19. 19. Hillsa investigations .	Riverine & Estuarine Sub-Station	4,000	The investigations if successful will indicate the reasons for fluctuations in Hilsa population an may lead to some corrective measures.
20. Water pollution investigations	Estuarine	12,054	This will reduce mortality being of fish now being caused due to water pollution.
Equipment and other charges for all the Projects.		1,70,000	

3.15. The Committee have been informed that besides the 20 Projects taken up for investigation during 1967-68 the Institute has in hand some carry-over work of 8 Projects continuing from the previous years. The Institute hopes that these 8 Projects will be closed within a short time.

3.16. In a written note furnished to the Committee, the Ministry have stated that the criteria for selecting new research projects/ schemes are:—

(1) The benefit they will accrue in terms of increased production; and

(2) The state of existing scientific knowledge on the problems concerned.

3.17. The representative of the Ministry has stated during evidence that "the priorities for these (20) Projects were taken up by the Fisheries Research Committee who had invited all the State Directors to come and enmuerate their problems. After their problems had been enumerated,.....we could crystallise our ideas and these 20 Projects were enumerated."

3.18. He has further stated that "The Director is a permanent member of the Research Committee and when a resolution is taken in the Research Committee the implementation depends on the Director and other details are worked out.....The problems which have been taken up in hand have generally an all-India applicability."

3.19. Asked to state how far the Projects taken up by the Institute have helped the various States in increasing fish production, the representative of the Ministry has admitted during the course of evidence that ".....our extension wing not being very effective or well organised in fisheries, we had followed a somewhat unorthodox technique, we organised training centres in the Research Institute itself. So we trained pituitary fish breeders, lyprinus carpio breeders, and pisciculturists, in large numbers and these people were the experienced people from the States; that is why today we are seeing that this technique is spread out almost uniformly all over India. These three new major techniques which have been developed in the Institute.....are aimed at producing more fish by this method....."

3.20. Asked to state the results of any assessment made of the impact of research conducted by the Institute at Barrackpore on the fisheries development in West Bengal, the Ministry, in a written note submitted to the Committee, have stated that "The research

conducted by the Institute has had noticeable affect on the fisheries development of West Bengal as well as other States where similar fisheries problems occur. The items of research which have made an impact on the different phases of development of fisheries are listed below:—

1. Survival of spaw in nurseries.
2. Transport of fish seed.
3. Spawn by induced breeding.
4. Breeding of lyorinus carpio."

The Ministry have not, however, indicated to what extent the production of inland fish in West Bengal has exactly gone up as a result of the researches conducted by the Institute. During the course of evidence the representative of the Ministry has admitted:—

> ".....It is difficult because the State directorate uptil now does not have a very good statistical unit to assess the internal production . . . to what extent the production has exactly gone up, I have no means to say."

3.21 The Committee cannot overemphasise the importance of taking up research projects which are likely to have a definite impact on fish production. They are glad to note that one of the criteria for selecting new projects is the benefit that would accure in terms of increased production. They would, however, stress that before a project is taken up for implementation, the economics thereof should be fully gone into and worked out in detail.

3.22 The Committee are unhappy to note that the Institute has no mechanism to assess the impact of its researches on fishery development either in West Bengal or in other States. They suggest that a method may be devised in consultation with the State Governments whereby it should be possible for the Institute to adjudge to what extent increased yield has been effected as a result of the tchniques evolved by it.

3.23. Asked to indicate the dates of inception and the probable dates of completion of the projects taken up by the Institute during the last three years the Ministry, in a written note furnished to the Committee have stated that "....the work on the various problems taken up since 1965-66 are of a continuing nature and with increasing experience and addition of new aspects of the problem for study, the entire present and future work of the Institute has been rendered into 20 Projects during 1967-68. It is, thus not possible to give either the dates of inception or the probable date of completion of the project as a whole."

3.24. During the course of evidence it has been further admitted that ".....for example, the project regarding paddy-cum-fish culture was continued for a number of years; after a number of experiments it was found that it was not fruitful. So there is a case which had not led to any results."

3.25. The Committee desired to know whether the Projects already approved for implementation by the Central Inland Fisheries Research Institute would be accorded the same priorities under the Indian Council of Agricultural Research to which the Institute has now been transferred. They were informed by the representative of the Ministry that the Council would no doubt like to continue the projects started by the Institute but certainly they had the right to evaluate and modify any project.

3.26 **The Committee cannot comprehend why it should not be possible to indicate the date of inception of a project. For purposeful planning it is imperative that time-targets setting out dates of inception and probable dates of completion of projects are laid down. All projects should be classified into short-term and long-term ones, and tentative dates for completion should be insisted upon.. It should be the responsibility of the Principal Investigator, who works out a particular scheme, to send annual progress reports of the scheme, so as to enable the Director and through him the Standing Fisheries Research Committee to evaluate the progress of the scheme. If a project has to be abandoned, it is desirable that it is discontinued at the earliest possible opportunity to save time and money. The Committee would also suggest that the Indian Council of Agricultural Research may examine all such schemes which have continued or are continuing for more than three years in order to find out whether the results achieved are commensurate with expenditure.**

D. New Projects

3.27. The Institute has formulated two new project which, it is stated, will have a definite impact on fishery development. These relate to (i) 'Research on Fish Farm designing and (ii) Study of Economics in Fisheries Research.

Research on Fish Farm Designing

3.28. Explaining the need for the initiation of the project on Research on Fish Farm Designing the Ministry of Food and Agriculture have in a written note stated that as a rough estimate there are 40,54,359 acres of cultivable water areas in the country. Of these, about 15,10,787 acres only are actually utilised at present, while another about 9,59,487 cres, which are readily available for culture,

are left unutilised. The reclaimable water area amounts to as much as 15,75,085 acres. Every piece of reclaimable water area presents its own problems for the development of fish farms. Neither has any standard design of a fish farm been evolved nor are the techniques of developing fish farms standardised. The cost of reclamation of derelict areas into fish farms also varies from State to State and site to site. By following progressive fish farming practices, an average annual production of about 500 lbs. of fish per acre to begin with, can be safely assumed in mass scale fish culture. This could give an annual yield of more than 3·5 lakhs tonnes of fish from fresh water culture alone against the present day fish production of over 1 million tonnes from the country's inland and marine fisheries. Inland pisciculture can be worked on a project basis and developed to acquire the status of an industry which in addition to producing nutritious protein contributing to solve India's food shortage, will also provide livelihood to a considerable section of hitherto neglected fishermen population of the country. Since water areas abound throughout the length and breadth of the country, extensive and intensive inland pisciculture is one of the quickest means of increasing inland fish production. It also needs no foreign exchange.

Study of Economics in Fishery Research and Development

3.29. It has been stated that fisheries are divided into two categories according to the manner of operations: (1) The culture fisheries where human beings sow the seed, nurse, rear and then harvest and (2) Capture fisheries where human beings have only to reap without having to sow. Modern pond culture involves a number of operations like construction of fish farms, collection of stocking material from natural sources or nurseries, weed control, insect and predator control, artificial feeding of growing fish etc. Successful trout culture in hatcheries as well as carp culture in ponds also depend upon administration of artificial food. Control of fish diseases in hatcheries, nurseries and other fish ponds is also an important operation in fish culture. In the field of capture fisheries, the natural stocks of fish in various types of waters like the reservoirs, large natural lakes, rivers, etc. have to be suitably conserved and managed in order to obtain maximum sustained yield.

3.30. It has further been stated that almost all the nations are expanding their fish catching power and controlled fish cultivation is getting increasingly more and more significant. The two important questions facing Inland Fishery workers are (1) how to increase yields without incurring additional costs and (2) how to avoid fluctuations in the catches. These questions are economic and technical. In the present day management of both capture and culture

fisheries, specially in the latter, fishery economics plays a vitally important role. No systematic study of economics in various fishery operations has so far been made in India. Incorporation of the principles of economics in every fishery research and development project is an essential pre-requisite for production of fish which can be marketed at reasonable price.

3.31. The Committee understand that the posts of a Fish Farm Engineer, an Overseer, an Estimator and a Draftsman have been sanctioned. It would be the duty of the Fish Farm Engineer to evolve fish farm designs in different soil conditions and to standardise methods of fish farm designing. Research work will have to be taken up on the following topics in conjunction with fishery biologists and chemists.

I. *Selection of location for fish farm*

1. The origin and quality of the water.
2. Soil type and water table.
3. Water supply conditions.
4. Topography
5. Source of supply of artificial fish food, labour, fertilizers, etc.
6. Transport problems.

II. *Design and construction*

1. Counter Survey
2. Water supply lines
3. Allocation of the water supply.
4. Drains.
5. Emergency cutlets.
6. By-pass arrangements.
7. Construction of minor dams.
8. Grading of margin.
9. Farm buildings etc.

3.32. The Committee are glad to note that the Ministry have taken a decision to set up a unit for research on fish farm designing in the Central Inland Fisheries Research Institute, Barrackpore. The fish farms not only serve as potential sources for supply of fish by culture practices but also as composite units for demonstration of improved methods of pisciculture and observation centres on breeding of various exotic and indigenous species, their rates of

growth, their adaptability to various environmental conditions and their optimum food requirement in different regions of the country under control conditions. Now that State Governments are setting up their own fish farms to augment the production of fish seeds, it is imperative that there is some standardisation in the designing of such farms. The Central Inland Fisheries Research Institute, Barrackpore should, in due course, be in a position to provide guidelines to the State Departments of Fisheries in the matter of designing fish farms so that economies in construction as well as reduction in the cost of reclamation of water areas could be achieved. The standardised designs prepared by the Institute should be made available to progressive farmers intending to take up fish farming as their profession. The Committee would stress that Fish Farm Designing Unit in the Institute should be set up without any delay.

E. Induced breeding of fish

3.33. It has been stated by the Ministry that the Indian major carps are favoured for culture in view of their fast growth, compatibility with other species and consumer preference. From the cultural point of view, the main difficulty in stocking the available water areas with major carps is the shortage of fingerlings (young ones). Although the major carps grow in all types of waters, they do not breed in confined waters. They, however, breed in flooded rivers.

3.34. During the flood, both desirable and undesirable species of fish breed and very often there is a greater representation of spawn of the undesirable varieties in the collection, that considerable extent of nursery space, money and effort are wasted in rearing unwanted spawn to a stage when the desirable species can be sorted out from the undesirable.

3.35. To overcome these difficulties attempts have been made to raise pure spawn by artificially inducing fish to breed in impounded waters.

3.36. The gonadotropic harmone of the pituitary gland, is known to control maturity and spawning in fishes. During the last decade top priority was assigned to the problem of artificial breeding and it has been possible to evolve a suitable technique of induced breeding with pituitary hormone injection, and already the percentage of success is stated to be over 60 per cent. The pioneering work in this regard was conducted at the Central Inland Fisheries Sub-Station at Cuttack. There are about 100 established artificial fish breeding centres in the country. Spawn production by induced breeding

in different States during 1964-65 as assessed by the Fish Seed Committee 1966 is given below:—

No.	State/River Valley Project	Major Carps Induced Breeding (in lakhs)	Remarks
1	Andhra Pradesh	22·02	
2	Assam	68·60	Year 1962-63
3	Bihar	8·00	
4	D.V.C.	..	
5	Delhi	..	
6	Goa	..	
7	Gujarat	37·00	
8	Himachal Pradesh	..	
9	Jammu & Kashmir	..	Year 1962-63
10	Kerala	21·80	
11	Madhya Pradesh	54·10	
12	Madras	13·15	
13	Maharashtra	85·50	
14	Manipur	0·20	Year 1962
15	Mysore	9·00	
16	Nagaland	..	
17	N.E.F.A.	..	Year 1963-64
18	Orissa	57·20	
19	Pondicherry	..	
20	Punjab	6·45	
21	Rajasthan	..	
22	Tripura	38·71	
23	Tungbhadra Board	61·94	
24	Uttar Pradesh	96·34	
25	West Bengal	..	
	TOTAL	575 01	

3.37. It has been stated that the technique of induced breeding with pituitary hormone injection was popularised through demonstrations, extension, training, pamphlets and movie films, etc. and as a result of the implementation of the Scheme a fair knowledge has been gained on a number of technical problems connected with artificial fish breeding, *viz.* location of external characters to assess sex and maturity, collection and preservation of pituitary gland, extraction and storage of hormone, stadardization of dose, optimum breeding condition. Even with hormone injection, the breeding success depended to a great extent on certain optimum environmental conditions. It has been shown that even when outside environmental conditions are unfavourable fish could be induced to breed by artificially providing the environmental conditions.

3.38. It has also been possible to adopt the same technique for the breeding of the Chinese carps which have been introduced into this country in recent years. There is also great scope for large scale production of pure fish seed by this technique.

3.39. The Committee have been further informed that the work on induced breeding conducted in India has been well appreciated both in India and abroad and already a number of scientists from different parts of the world have visited the sub-station at Cuttack to familiarise with the work on the artificial breeding of carps. The F.A.O. has also made several requests for sparing the services of Indian scientists engaged on this work for demonstration of the technique in other countries.

Fish Seed

3.40. It has been stated that the present production of fish seed in the country is grossly inadequate and cannot meet the demands even for adequately stocking the areas cultivated at present. The total requirements of fish seed for stocking all available water areas are estimated at 1700 crores of which the present estimated production is only 366 crores as is evident from the following table:

	Spawn	Fry	Fingerlings
		(In crores)	
The total seed requirements for the presently cultivated waters	550·59	165·18	82·59
The total seed requirements if all existing readily cultivable water areas are to be stocked	945·90	288·77	141·39
The extra requirements	579·69	219·66	102·99

(The total requirements of spawn will go to 1700 crores if areas an-reclaimed).

There are, in addition, vast stretches of cultivable areas, which have not yet been brought under cultivation and those which could be reclaimed for fish culture. There are 40,54,359 acres of cultivable water areas in the country including the part which remains to be reclaimed for culture purposes. Of this about 15,19,787 acres are only utilised at present while another about 9,59,487 acres, which are readily available for culture, are left unutilised.

3.41. For production of quality spawn of *Catla, Rohu and Mrigal*, techniques have been recently developed by the Central Inland Fisheries Research Institute to induce these species to breed in confined waters by injecting pituitary gland extract, and this technique is being employed by several states. A list of the important major carp induced breeding centres in India is given in Appendix VII. The contribution of fish spawn by the method of induced breeding is 1·5 per cent of the total estimated production.

3.42. A table is given below to indicate the salient points and relative advantages and disadvantages of Spawn production by the 3 methods (i) Natural Collection (2) Pituitary Breeding (3) Bundh type Breeding.

Natural Collection	Pituitary Breeding	Bundh type Breeding
1. Gives mixed spawn	Gives pure Spawn of each species	Gives pure Spawn of mixed species
2. Does not need an established fish farm and consequent costs.	Needs a large farm with specific facilities	Needs waste area suitable for dry bundhs
3. Cost is cheaper	More costly but is offset where transport over long distances is involved.	Some transport is involved as the suitable dry bundh may not be available near the fish farm.
4. Does not need elaborate apparatus	Needs some apparatus	Needs some apparatus.
5. Training of staff easy	Needs intensive training and practice.	Needs intensive training and practice.

3.43. The Committee have been informed that it is left to the judgement of State Directors of Fisheries as to the priority to be given to each.

3.44. Since there is a wide gap between the requirement and actual production of fish seed the Committee wanted to know whether any plan has been darwn up by the Government for mass scale production of fish seed by the Induced method. In reply the Committee have been informed in a written note that the induced method has yet to spread more widely and mass scale application requires large fish farms to store breeders, capital to construct the same and trained operatives. Almost every inland State has planned pituitary breading on a pilot scale and the stage has not yet been reached to plan a mass scale production.

3.45. In view of the fact that 98 per cent of fishes caught are from natural resources, rivers, lakes, etc., and less than 2 per cent are obtained by means of artificial breading, the Committee desired to know whether it would not be desirable to concentrate on the capture of fishes from the natural waters rather than on artificial fish breading at considerable expenditure.

3.46. In a written note furnished to the Committee it has been stated that the detailed figures of economics of artificial fish breading compared to natural spawn have not been made so far and will be a part of the study by the Economics unit of the Institute proposed to be started. A study made sometime back in Orissa indicated the cost of pituitary Spawn at Rs. 125 for 50,000 spawn as against Rs. 20 for riverine collections. The high rate was due to heavy establishment costs and need for the operations being conducted by higher level staff.

3.47. During the course of evidence the Committee have been informed that "....it is a little too early to think of an economic analysis. What is urgent is that this technique should be learnt by operatives like our supervisors."

3.48. The Committee have been further informed that induced breeding work has been one of the items of activities in fish farms and has not been treated on a commercial basis.

3.49. The Committee are of the view that for any successful implementation of fish culture programmes it is of paramount importance that fish seed of the desired species are made readily available in sufficient quantities. Since the production of the fish seed in the country at present is grossly inadequate and cannot meet the demand of even adequately stocking the areas cultivated, the Committee feel that there is an immediate need to make concerted efforts for increasing production of fish seed.

3.50. The Committee would in this connection like to invite the attention of the Government to the Fish Seed Committee Report, 1966 wherein it has been recommended that the objective of all the States should be to establish at least one centre for induced breeding in each district, with the required complement of nurseries and rearing tanks, within the next ten years. Experimentation to standardise the doses, study of optimum breeding conditions like temperature, oxygen, etc., which are conducted at the Central Inland Fisheries Research Institute, should be statistically designed and the results thereof should be made available within the next two years.

3.51. The Committee strongly recommend that States which have already succeded in induced breeding of carps should intensify their activities in this direction, with a view to enhance the production of seed. In the case of those States which have not yet achieved success trained extension officers should be sent to demonstrate the technique.

3.52. As the success of induced breeding of major carps demands on the 'receptivity condition' of the breeders in regard to pituitary hormone injections, the Committee feel that it would be worthwhile to collect information regarding the periods at each centre during which the breeders are likely to react favourably to hormone treatment. This would provide gainful knowledge for achieving success at each centre in the future years. Further thought can then be given as to how best the period of receptivity of the breeders can be prolonged at each of the centres.

3.53. The Fish Seed Committee, 1966 have stated in their report that 'adiposity in carps appears to come in the way of the breeders attaining receptivity condition'. The Committee suggest that efforts must be made to determine items of diet that would not lead to accumulation of excessive fat in the breeders.

3.54. The Committee understand that experiments on the induced breeding of mullets have already been initiated by the Central Inland Fisheries Research Institute, as well as by the Government of Kerala. They suggest that the work should be continued and experiments to induce Bhekti to breed through pituitary hormone administration should also be undertaken by the Central Inland Fisheries Research Institute at an early date.

3.55. The Committee understand that work on the induced breeding of Hilsa through pituitary hormone administration has also been recently initiated by the Central Inland Fisheries Research Institute.

They suggest that this work should also be continued by the Institute alongside experiments on its suitability for culture in impoundments. The seed thus obtained can also be utilised for stocking rivers when necessary.

3.56. The Committee further suggest that possibility of establishing a series of pituitary gland 'banks' may be explored by the Central and State Governments.

3.57. The Committee are unhappy to note that about 9,59,487 acres of water areas which are readily available for culture are left unutilised. They strongly recommend that large stretches of cultivable water areas in the country which are at present left unutilised should be brought under cultivation by using the seed procured through induced breeding.

3.58. The Committee are concerned to note that economics of induced fish breeding has not been worked out so far by the Central Inland Fisheries Research Institute inspite of the fact that evolution of induced breeding technique is said to be the most significant achievement of the Institute and there is a pressing need for quality fish seed from various States. The Committee hope that no time would be lost in undertaking a study of the relative merits and economics of production of fry through collection from natural sources, pituitary injections and bundh breeding, by the Economic Study Unit that is soon going to be set up in the Institute.

3.59. In the meanwhile the Committee would like to stress that they attach greater importance to the development and increase in inland fish production by greater exploitation of the fish seeds which are available from the natural waters. They need hardly stress that the collection of fish seed from the natural waters can be increased manifold as at present only 2 per cent of the natural fish seed available in natural waters are caught. Moreover, as already revealed in a study made some time back in Orissa, while the cost of pituitary spawn was Rs. 125 per 50,000 spawns, the cost for riverine collection was only Rs. 20 for the same number. In the circumstances the Committee would urge that Government should encourage at all levels collection, exploitation and utilisation of fish seed from the natural waters alongside production of fish seeds by artificial means.

Induced Breeding work in Bihar

3.60. A Study Group of the Estimates Committee have visited the Carp Induced Breeding Centre, Muzaffarpur (Bihar) in October,

1967. They have been informed that induced breeding of fish has not been taken up on mass scale in the State of Bihar as it has got the greatest natural resources of fish spawn. The fish spawn are collected mostly from the rivers Ganga, Sone and Kosi and sent to Calcutta from where purchasers from all over the country take to their States for rearing. Since 1962 induced breeding trials have, however, been taken up by the research staff at various fish fry distribution centres of Bihar. It has been added that induced breeding at Muzaffarpur was attempted in the year 1964 and the results were very encouraging. The Study Group have been informed that regular induced breeding is done at Ranchi and Hazaribagh, besides trials by Fisheries Research Laboratory, Patna. Since 1966-67 programme to establish at least one composite fish farm for each district has been taken up. With their establishment, regular breeding of various species of fish for obtaining quality spawn is expected to materialise.

3.61. The Study Group have notified that the pond used for induced breeding at Muzaffarpur is small and not properly maintained. As regard the cost of induced breeding trials the Study Group of the Estimates Committee have been informed that it could not be worked out at this stage as the work has not yet been taken up on mass scale.

3.62. The Committee suggest that productive ponds providing suitable nursery must be selected near all breeding centres rearing the young ones of various species and for maintaining a good stock of breeders.

Coordination

3.63. Asked to state the nature of liaison between the (i) various Induced Breeding Centres in the country and the Central Inland Fisheries Sub-Station, Cuttack; (ii) various Induced Breeding Centres in a State and the Universities in the State undertaking research of fisheries; and (iii) various Induced Breeding Centres *inter se* the Committee have been informed in a written note that (i) there is no direct liaison with the Central Inland Fisheries Research Institute and the Artificial Fish Breeding Centres in the States but the results from the States are sent to the Ministry from time to time; (ii) Except in the case of Mysore where some facilities were given to the University by the State Fisheries Department, there has not been much work on this line in the Universities, (iii) There has been no necessity to have a coordination among the breeding centres except compilation of results in the Ministry on a broad basis.

3.64. The Committee cannot too strongly stress the need for co-ordinated approach to this problem and proper dissemination of the results of researches achieved in the various induced breeding centres under the Central and State Governments. The Central Inland Fisheries Research Institute should coordinate with State Fisheries Departments and collect information regarding the progress of the schemes in various States. It would be useful if the data collected are published in the Annual Report of the Institute.

F. Composite Fish Culture

3.65. In a note prepared for the all India Fisheries Conference (1956) it has been stated that the main-stay of fish culture in India has so far been the Major Carps *viz., Catla, Rahu, Mrigal and Calbasu.* Though they are highly suited for culture in impounded waters and yield satisfactory production, the need for annual stocking operations presents a great problem, as these Major Carps generally breed only in rivers and every year fish seed has to be collected from the natural spawning grounds and transported over long distances for stocking purposes. Even though serious attempts have been made by some State Governments to locate the spawn and fry collection centres, in many areas the percentage of Major Carp fry, in the collections, has been found to be very low, making the operations uneconomical. In view of this, a number of States have to import fry from surplus States, involving additional expenditure, risks of mortality during transport and other difficulties. Judging from the increasing demand of fish seed and extension of fish culture in various States during the last few years, it would appear that only a very small fraction of the culturable water areas in the country can be stocked if we depend on the Major Carps alone. Even if the increased exploitation of the carp seed resources from the rivers do not adversely affect the commercial fisheries of the Carps, the organisation of fry collection, rearing and transport on a large scale may become extremely difficult. This points to the need for exploring the possibility of introducing for culture other suitable fishes which breed in confined waters.

3.66. Besides the sport fishes, like Brown trout and Rainbow trout, which have established in the upland waters of Kashmir, Himachal Pradesh, the Nilgiris, etc. the food fishes Gourami, Mirror Carp and Tilapia have been introduced into Indian waters. It is generally accepted by fishery scientists and administrators that adequate experimental and observational studies should precede any scheme of introduction of exotic fishes into a country, as it is essential to assess their probable effect on the indigenous fisheries. No

such adverse effect was feared at the time of introduction of Gourami and Mirror Carp, but in case of Tilapia, which is extremely prolific and hardy, the possibility of adverse effect on the indigenous carp fisheries cannot be ruled out. The Committee have been informed that by intensive manuring and artificial feeding, it was possible for the Institute to harvest about 5,000 lbs. of Tilapia from a one-acre pond.

3.67. Explaining the background of Tilapia culture in inland waters the representative of the Ministry has stated in evidence, "Tilapia was posed before us by F.A.O. as it could increase production per acre. So this was being experimented for a number of years in several places. Then we found that it got mixed with others and it was not within the bound of an average fisherman as it required control of the population very rapidly. The fish breed so rapidly that the tiny fish were found all over the tank and ate food."

3.68. He further stated that by judicous utilisation of this exotic fish along with other carps would lead to better results. Random introduction of this fish would spoil other fish also.

3.69. It has been stated in a written note furnished by the Institute that detailed investigations were carried out on the culture of major Indian Carps and their compatibility with Tilapia and the culture of common carp with Tilapia was found to have adverse effect on the growth of carp fry.

3.70. The Committee have been informed that experiments are being conducted for growing together in one farm three types of Indian carps and some exotic varieties like silver carp, grass carp and common carp etc. with a view to utilising to the maximum extent the food available in the entire body of water thereby raising the fish yield. The main point in composite farming is to correlate fish food with fish population.

3.71. Explaining the *raison d'etre* of mixed farming, the Ministry in a written note have stated,

> "In India, catla, rohu and mrigal are generally stocked together for culture in the freshwater ponds without taking much care in respect of their relative numbers, total numbers, size and weight except that a few farmers stock these fishes in the ratio of 3.3 : 4 of the above stated species in the order stated. Sometimes calbasu is also added to the combination. These fishes are of different feeding habits and restricted to the particular food and accordingly feed in different zones—surface, column and bottom

layers of the pond. It is also well known that minor carps weed fishes generally constitute a considerable percentage of the stocking material. These fishes too, more or less, feed on the same food as the carps. All the ecological niches in the pond are not fully occupied by the different fish and a good quantity of surplus fish food is left over in the pond and remain unconverted into fish flesh. It is in this context that the concept of mixed fish farming for obtaining maximum production has to be considered."

3.72. By judicious selection and culture of the above species in our ponds it should be possible to increase the production in our culture operations considerably. To formulate such a programme of composite culture of fish throughout the country in its different soil and climatic conditions coordinated research investigations on the concerned problems, *viz.* selection of the species, rate of stocking, ratio, size, weight, artificial feeding, harvesting methods, etc. are considered essential.

3.73. The following table gives a resume of the results achieved so far by the Central Inland Fisheries Research Institute:—

Year of Observation	Rate of stocking per ha.	Catla	Rohu	Mrigal	Silver carp	Grass carp	Common carp	Gourami	Production in kg	Period
1966	4500	1·5	5	1	4	3	3	0·3	(*i*) 2478 (*ii*) 2024	one year
1966	5000	1·5	5	1	4	3	3	0·3	(*i*) 3494 (*ii*) 3670	one year
1967	5000	2·5	5	2·5	4	2	2·5	0·5	Calbasu (*i*) 2474 (*ii*) 1447	10 mths.
1967	6000	3	4	2·5	6	1·5	2·5	0·5	(*i*) 1697 (*ii*) 1547	6 mths.

Calculated approximate net income per hectare per annum from results of four experiments

Exp. 1

Gross weight of fish harvested (ha/annum)	2570 kg
Cost of same @ Rs. 3·75/kg	Rs. 9637·50 p.
Expenditure/ha/annum	Rs. 1985·00 p.
Net income/ha/annum	Rs. 7652·50 p.

Exp. 2

Gross weight of fish harvested (ha/annum)	2230 kg.
Cost of same @ Rs. 3·75 kg.	Rs. 8362·50 p.
Expenditure/ha/annum	Rs. 1985·00 p.
Net income /ha/annum	Rs. 6377·50 p.

Exp. 3

Gross weight of fish harvested (ha/annum)	3500 kg.
Cost of same @ Rs. 3.75/kg	Rs. 13,125·00 p.
Expenditure/ha/annum	Rs. 2,593·75 p.
Net income/ha/annum	Rs. 9,531·25 p.

Exp. 4

Gross weight of fish harvested (ha/annum)	4210 kg.
Cost of same @ 3·75 kg.	Rs. 15,875·00 p.
Expenditure ha/annum	Rs. 3,593·75 p.
Net income/ha/annum	Rs. 12,281·25 p.

3.74. It has been further stated that it has, however, not been possible to develop formulate of species combination whereby really high level of production can be achieved in culture operations in different soil and climatic conditions prevalent in the country. The general yield of fish per hectare of ponds ranges from 200—2500 Kg. in the different parts of the country depending upon the care bestowed and food used in culture operations.

3.75. Question about the overall impression of the Institute in regard to the introduction of composite farming, the representative of the Institute stated during the course of evidence that the results had been very encouraging. The Insitute had taken up a number of ponds and reservoirs for mixed farming in response to requests from farmers. But the technique for mixed farming needed scientific competence and this was being acquired in the field. In the reoriented programme of work of the Institute, composite culture of exotic fishes and Indian fishes had been allotted priority number one.

3.76. In reply to another question, it was stated that the economics of mixed farming had not been fully worked out but it was proposed to "have a look on the details of economics in the near future."

3.77. The Committee attach considerable importance to such items of research as are likely to have a definite impact on the yield of fish. From this stand point, there cannot be two opinions about the need for strengthening research on the introduction of exotic fishes in reservoirs and their culture along with indigenous varieties The Committee would, however, like to stress that fish farmers accustomed to grow the traditional fishes have a natural reistance to the introduction of exotic fishes and it is for the extension staff of the Institute to explain and demonstrate to fish farmers that exotic fishes like mirror carps, grass carps, etc. do not denude the waters by eating away popular varieties of fishes.

3.78. The Committee feel that it is desirable that economics of mixed farming are fully worked out and made known to the State Departments of Fisheries for the benefit of progressive farmers who want to take up mixed farming to augment their income.

3.79. The Committee also feel that there is a need for acquainting the fish farmers about the harmful effect on the growth of carp fry by the random introduction of Tilapia. The Institute may bring out popular pamphlets to educate the fish farmers about the economics or effects of culture of Tilapia in ponds and reservoirs.

G. Culture of Fish in Paddy Fields

3.80. The Committee have been informed that the question of research in connection with fish culture in paddy fields was discussed at the meeting of the Central Fisheries Research Committee held in

April, 1956 and also at subsequent meetings. Extracts from the proceedings of the Committee held in April, 1956 are reproduced below:—

> "The Chairman stated that very scantly information was available about the culture of fish along with paddy so far as India was concerned. The information received from the States and other sources did not indicate any definite results. This item of work was of great importance and he wished that the Central and State organisation should take it up on scientific and statistical basis. So far, this work had not been done on these lines. Mysore attempted it on a very small scale and did not obtain any worthwhile results. At the Central Inland Fisheries Research Station this work was still being planned. In some States this work was done in a more or less haphazard manner and the results were far from conclusive. Whether the yield of fish from paddy culture was going to be substantial and whether the culture of fish would affect the yield of paddy were not known."

3.81. At the meeting of the committee it was stated that "work on fish culture in paddy fields was undertaken in Madras in collaboration with the owners of fields and they had to face many difficulties. Often, all the fields were flooded. They spent about Rs. 5,000 on the expirement and realised only Rs 95. The experiment was a complete failure." An opinion was expressed by the Chief Research Officer, Central Inland Fisheries Research Station, Calcutta that "the problem of growing fish in paddy fields was not of very great importance in India. In fact, the experiments were tried in Mysore State, where there is no scope of growing fish in suitable paddy fields. It is only in Sundarbans, and possibly a few other similar areas where water always remains at a high level that some scope for fish culture in paddy fields exists." The Central Fisheries Research Committee recommended that the experiments on paddy-*cum*-fish culture should be carried out in cooperation with the State Agriculture Departments and the Central Rice Research Institute, Cuttack.

3.82. At the meeting of the Central Fisheries Research Committee held in January, 1967, the Chairman of the Committee remarked that "the problem of paddy-*cum*-fish culture is not of a very great importance in India and has only a limited application to a few areas where results of researches could be applied." The Committee recommended that investigations may be carried out in West Bengal State. Kerala State and Central Inland Fisheries Research Station and Central Rice Research Institute, Cuttack.

3.83. From the proceedings of the fifth meeting of the Central Fisheries Research Committee held in July, 1958. it is gathered that the results of the experiments carried out in Cuttack at the Central Inland Fisheries Research Station were disappointing and the Chief Research Officer of the Institute expressed a doubt about the need for further investigations. Experiments carried out in Bihar however indicated that paddy-*cum*-fish culture was successful in certain areas. The Central Fisheries Research Committee resolved that "more intensive work on rearing fish in paddy fields should be statistically designed and carried out in Bihar and other States where requisite facilities are obtainable."

3.84. The work on paddy-*cum*-fish culture was again reviewed by the Central Fisheries Research Committee at their meetings held in April, 1959. The Committee having reviewed the progress of work on paddy-*cum*-fish culture recommended that work may be further intensified and field trials extended to privately owned paddy fields and that economic aspects of the venture may be carefully worked out and details made available to the Committee.

3.85. In a written note furnished to the Committee it has been stated that experiments were carried out between 1956-57 to 1960-61 in the experimental paddy plots of Central Rice Research Institute, Cuttack. The fry and fingerlings of the Indian major carps, catla, rohu and mrigal, common carp and Tilapia were used as stocking material in these paddy plots.

3.86. The following are stated to be the results of these experiments:

(i) The paddy plots were very poor in respect of fish food organisms. Productoin plankton being low, survival of fish fingerlings was extremely poor.

(ii) Fish fry and fingerlings were subject heavy predation by otters and birds of prey, finally resulting in low total yield.

(iii) The yield of paddy was slightly less from plots where fish were stocked than in the control plots.

3.87. It was concluded that in India where the bulk of the rice crop depend upon the rainfall for water-supply, the erratic distribution of rain on failure of monsoons may result in complete or partial failure of rice and fish crop. Poor survival and low yields of fish due to scarcity of fish food organisms and predators did not suggest a bright future for fish culture in paddy fields in India.

3.88. The Committee have been further informed that with the cultivation of high yielding varieties of paddy involving heavy manuring and use of fungicides and insecticides for disease and pest control, the prospects of fish-*cum*-paddy culture are growing dimmer and dimmer.

3.89. This research was also carried out in Bihar and Orissa and the fields were not found to be economic.

3.90. Asked how much time was spent before it was realised that culture of fish in paddy fields was not a practical proposition, the representative of the Ministry has stated during the course of evidence that "We must have spent at least Five Years because it was reviewed several times and sufficient replicas had to be obtained before the results were declared significant".

3.91. The representative of the Ministry added that "In any scientific practice, if the results are not significant, there is room for fluctuation.....We do not abandon the projects because negative results are not always significantly negative.....It might require even a longer time." The representative of the Ministry further stated that ".....The point is whether it will be an economical proposition to take the fingerlings, put them in the paddy fields and then see whether they give more income to farmers. With great reluctance we kept the project....It has been kept at low priority."

3.92. Asked how much expenditure was incurred on the experiments carried on the breeding of fish in paddy fields it has been stated by the Ministry that "there is no separate account of expenditure but as land was obtained free and only 2 to 3 research staff were engaged (who also did other works as this work has seasonal) the expenditure was kept at a minimum."

3.93. The Committee note that the Central Inland Fisheries Research Institute in conjunction with the State Agricultural Departments has been carrying on investigations on paddy-cum-fish culture during the last 12 years and the results achieved so far have not proved to be encouraging. The Committee feel that the scheme has not been properly conceived and at no time an attempt appears to have been made to work out the economics of the whole project. The Committee are surprised that there is no separate account of expenditure incurred on the project. In view of the fact that the experiment has been going on for a number of years in several States, the expenditure on this infructuous project must be considerable. The Committee suggest that the Indian Council of Agricultural Research may conduct an appraisal of the entire scheme with a view to decide once for all whether the scheme should be continued or abandoned.

H. Brackishwater fish farm at Kakdwip

3.94. Brackishwater fish farming in tidal impoundments or bheries in the Gangetic Delta is based on empirical knowledge and traditional practices. Little scientific work has been done to determine how to obtain optimum fish production in such operations. Fisheries Research Committee (1954) in their Report on the Central Inland Fisheries Research Station has made the following observations:

> "The areas around the estuaries of Matlah are suitable for brackish-water fish culture and some private fish farms are now in operation in these areas. For working out improved methods and helping to stabilise the fish farm industry and increasing production, it is necessary to establish a brackishwater farm in this area, where experimental work may be carried on along proper scientific lines. Work in this farm should be chiefly on mullets and prawns and experiments should be designed and results analysed with the help of a competent statisticians. The economics of operations under different conditions that exist in the area should receive special attention."

3.95. The Committee have been informed that for brackishwater fish culture studies a fish farm is being constructed at Kakdwip (West Bengal) to conduct statistically designed experiments in order to develop technical know-how for maximising production in brackishwater fish farming.

3.96. The experimental fish farm of the Institute is nearing completion. It is located on 35.39 acres of land acquired for the purpose at Kawdwip on River Muriganga. There are arrangements in the farm for automatic stocking of fish and prawn seed by the ingress of tide-water. There are 40 experimental nursery ponds each of identical size (22m x 6m), two rearing ponds (51m x 19m) and one stocking pond (43m x 22m). All these ponds are independently connected with the feeder canal so that they may be filled or emptied separately as and when required, by the adjustment of sluice shutters fitted to each pond.

3.97. The cost for the construction of the farm at Kakdwip including the laboratory and two Class IV staff quarters is estimated at Rs. 2,40,400.

3.98. The representative of the Ministry has stated during evidence that "brackishwater fish culture is a very major industry in Indonesia and Philippines. India has similar conditions and if it could be proved that the technique developed can be economically applied,

there is a big room in this. In the Sunderbans we are drawing up a pilot scheme for taking up the area and starting brackishwater fish culture. This experiment will give us valuable guidance."

3.99. In reply to a question the representative of the Ministry has stated that brackishwater swamps were surveyed by the State Governments. They had got the statistics but they were very rough.

3.100. The Committee note that while the Fisheries Research Committee recommended the establishment of a Brackish Water Fish Farm in the estuaries of Matlah as far back as 1954, it has taken as long as 12 years to finalise the arrangements for the setting up of a Brackish Water Fish Farm. The Experimental Farm now being set up at Kakdwip in West Bengal has still to get into strides before any fruitful researches can be undertaken by it. The Committee would suggest that all the preliminaries regarding the staffing of the Experimental Farm, provision of equipments for the laboratory, staff quarters, etc. should be expeditiously completed so that research on brackish-water fish could be undertaken without any delay. The Committee hope that alongside construction of Brackish Water Experimental Fish Farm, the Ministry would, in consultation with the State Government, arrange to provide transportation facilities so as to connect the adjoining fishing centres with the Farm.

3.101. The Committee understand that there are vast areas of cultivable brackish waters which are potentially rich resources of fish production and are still unharnessed at present. Barring a few exceptions, there is hardly any information regarding the availability and magnitude of brackish water fish seed in the country. The Committee would suggest that a survey of the areas of cultivable brackish waters may be undertaken by the Ministry in consultation with the State Government.

I. Freshwater fish farm at Panna

3.102. It has been stated that the few ponds that are available at the Killa Fish Farm in Cuttack fall far below the requirements for comprehensive investigations on the large number of culture fisheries project, viz. Optimum per hectare production of fry, fingerlings and fish in culture fishery operations, study of induced fish breeding techniques, freshwater prawn culture, murrel and other air-breathing fish culture, selective breeding and hybridization in connection with induced breeding, exotic fish culture, weed control and Frog farming. In order to derive acceptable results it is necessary to conduct statistically designed experiments on the numerous problems into which each project is split and for which a big fish farm comprising nusery, rearing and stocking ponds with attached laboratory facilities is absolutely essential.

3.103. The Committee understand that the urgent need for a well planned large Central Experimental Fish Farm was recognised at the commencement of the Third Plan itself, but suitable land required for the purpose was not readily available.

3.104. Now an experimental fresh water fish farm is proposed to be constructed at Janakpur, Panna (Madhya Pradesh). The farm is to be located in 284.54 acres of land, obtained free of cost from the Department of Agriculture, Government of Madhya Pradesh. The site has a gradual slope and this could suitably be utilised for the construction of a series of nuseries, rearing and stocking ponds so that each pond could be filled in by gravitation and emptied as and when required.

3.105. The Committee have been informed that before intiating action to construct fish farm at Panna it was felt necessary to fully ensure through properly conducted soil surveys and analyses as well as through a few trial ponds dug|constructed in different parts of the farm, that the land would be suitable for the construction of fish farm, to avoid any infructuous expenditure. Such trials are in progress.

3.106. The originally proposed expenditure in setting up the Central Experimental Fish Farm at Panna was Rs. 19 lakhs. This includes cost of construction of experimental ponds, laboratory, workshop. residential quarters. etc. The annual recurring expenditure for the fish farm alone, when fully in commission may come to about Rs. 1,00,000.

3.107. The Committee are glad to know that an experimental fish farm is going to be set up at Panna (Madhya Pradesh). They feel that the setting up of this farm would give a much-deeded fillip to the development of inland fisheries in Madhya Pradesh and other adjoining States. .The Committee hope that the Fish Farm would undertake experiments not only in regard to the known varieties of fishes which thrive in West Bengal and Orissa but also other economic species which can be grown under control conditions in other parts of the country. The Committee would stress the need for the early activisation of the project.

J. Weed Control

3.108. The need to keep the weeds under check or to eradicate them is quite obvious for the proper explitation of fisheries.

3.109. Weed control methods can be broadly classified into manual, cultural, mechanical, shading, biological and chemical. In the tra-

ditional manual methods, weeds are pulled out or uprooted with the hand or cut with hand scythes or other simple implements and finally dragged to the dry pond margins. Cultural or preventive methods include ploughing-in, grazing or burning of marginal weeds, draining of ponds and removal of underground perrennating parts, desilting in old silted ponds, sudden flooding in ponds with arrangements for regulation of waterlevel, deepening of pond margins, erection of barriers to prevent entry of large floating weeds and periodical fertilisation to create useful algal blooms which exclude leafy submerged weeds. Mechanical methods include use of weed cutters (surface of underwater), power winches, drag chains and bottom excavator. The usual agents for shading submerged weeds are mechanical covers, covers of an easily removable floating plant, colouring dyes and turbidity produced artificially by silt or induced algal blooms. In biological control animals like nutria or manatee (allied to sea mermaid), musk-rats, petiole boring insects, etc. have been used for destroying emergent weeds and weed eating fishes for submerged weeds. The classes of chemical used as weedicides are soil sterilants like 'atlacide', T.C.A. and sodium 2, 4-D., contact herbicides which are used as sprays (e.g. diesel distillate; oven kerosene) or applied in water (e.g. copper sulphate; sodium aresenite; chlorinated benzenes; coal tar napthas), hormone weedicides like M.C.P.A., 2, 4, 5-T which kill plants by inducing abnormal growth in them, fertilisers like urea and superphosphate which when applied in excess kill submerged weeds and various algicides used against algal blooms and mats. Sometimes several of these methods are combined to meet special problems of weed control in fish ponds.

3.110. The Committee understand that since most of our ponds and tanks are also used for bathing, washing, watering vegetable gardens, culturing fish and even drinking, the methods found efficient or economical in the Western countries frequently do not work well in India.

3.111. During the course of evidence the representative of the Ministry has stated that "Our approach has been two-pronged. One is to biologicallv control the weeds, and for that purpose we have brought in the Chinese fish, namely, the grass carp from China. That is very effective in controlling certain selected types of weed, but unfortunately it does not consume all the aquatic weeds which menace our waters. The other approach has been the chemical one in which we have tried several chemicals. Some of these have given extremely encouraging results, as for instance, ammonia, 2, 4-D and copper sulphate pellets. They have now been passed on to the different States for trial in their respective jurisdiction."

3.112. The Committee have been further informed in a written note furnished by the Ministry that the results obtained by Central Inland Fisheries Research Institute in regard to weed control have been brought to the notice of all State Governments for implementation of experimental trials. Specific methodology has been prepared and supplied by the Institute for adoption by the different States.

3.113. The Committee understand that at the meeting of the Central Fisheries Research Committee held at Madras in October-November, 1966, the question of use of ammonia for weed control was discussed. It was pointed out that most of the chemical weedicides were ineffective on submerged aquatic weeds; mechanical weeding would mean wastage of nutrient matter. Ammonia was effective for submerged weed and had a fertiliser value also. The Central Fisheries Research Committee recommended that a coordinated programme to assess the suitability of ammonia and grass carp to control submerged weeds and silver carp and copper sulphate to control phyto-plankets should be taken up. The Committee also recommended that extensive field trials should be undertaken in the States and the data thus collected should be evaluated and a decision taken for or against the use of ammonia for weed control.

3.114. The Committee are glad to note that researches are being conducted by the Institute for the control of weed by chemical and other means so as to preserve fisheries. They would, however, emphasise the need for working out the economics and usefulness of various weedicides so as to recommend them as a standard eradication method for submerged weed. Alongside experiments on the chemical weedicides, the Committee would suggest that trials may be conducted to see if water-hyacinth and other water weed could be used as compost for agricultural crops or as nutrients for enriching the fish ponds for better production of fish.

K. Fish Pathology

3.115 The importance of studies on fish parasites and diseases is related to two main factors from the fisheries point of view, viz. reduction in number of fish due to the resultant mortality and lowering of market value due to impairment of palatability and/or appreance. During the Third Plan period the Central Inland Fisheries Research Institute initiated investigation on epidemic diseases which cause large scale mortalities of fishes and also Chemotherapy, a subject in which practically very little work had been done in India. Studies on an epidemic eye disease of Catla, Dropsy, Ulcer disease and some common parasites of the major carps are important contributions from the Institute in this respect.

3.116. Several factors resulting from the methods involved in management of pond fisheries favour large-scale infections from organisms which way normally occur in nature, but are not economically important. These can be of parasitic origin as in the case of several bacterial and virus diseases, mycoses, protozoan, helminth and crustacean infections etc., or non-parasitic affections like fatty degeneration, avitaminoses, intoxications, several types of benign as well as malignent tumours, etc. Work done so far has yielded valuable information on some serious diseases like an eye disease of Catla, Dropsy, Ulcer disease of major carps, Ichthyophthiriasis, Argulosis, etc., but several more diseases are yet to be studied. Further, observations made so far have indicated that Trichodina, Sporozoans, *Gyroda-ctylus* and Fungus infections are common in many nurseries and cause large scale mortality. The Institute proposes to take up detailed investigations on these problems,with special emphasis on suitable preventive and control methods.

3.117. It has been stated that another topic that deserves special attention is the relation between fish diseases and nutrition. This involves experimental studies on Avitaminoses, Hypervitaminoses and general metabolism. As very little information is available on susceptibility to bactarial diseases in fresh water fish showing subclinical manifestations of specific vitamin deficiencies it is necessary to study in this context the nutritional requirements of the common cultured fishes and also the description detection and prevention of nutritional deficiency syndromes.

3.118. In a written note furnished to the Committee the following have been listed as achievements of the Fish Pathology Unit of the Institute:

Specific instances where fish diseases and infections have been controlled:

(i) Fungus infection in several nurseries, rearing tank and stocking tanks by the use of 3 per cent common salt solution, 1:2000 Copper Sulphate solution, 1:1,000 potassium permanganate solution.

(ii) Control of fungus infections of carp fingerlings transported over long distances by the use of 1:2,000 Copper Sulphate solution and different strengths of malachite green.

(iii) Control of fungus infections in trout hatcharies of Kashmir by using different strengths of malachite green.

(iv) Control of fin and gillrot in several nurseries, rearing and stocking tanks (and also acquaria) by giving dip treatment for 1 minute in 1:3,000 Copper Sulphate solution.

(v) Control of gillrot caused by the fungus Branchiomyces spin Cuttack farm by using 3 per cent to 5 per cent salt solution for 5 to 10 minutes.

(vi) Cure of fingerlings of rehu affected with fin-rat using 5 ppm. Copper Sulphate followed by a batch in 3 per cent common salt solution. Mortality in some ponds was checked with 0.5 ppm. Copper Sulphate group treatment.

(vii) Control of ulcer disease in big tanks at Kharibari, using 1:2,000 Copper Sulphate solution.

(viii) Cure of dropsy disease in two jheels and several stocking ponds.

(ix) Control of a new epidemical eye disease of Catla using 8 to 10 mg per litre of Cholorornycatin and prophylactic treatment with potassium permanganate (1 ppm).

(x) Control of Ichthyophthiriasis with hourly treatment in 1.5,000 formalin, 2 per cent Sodium Chloride solution and 1: 5,00,000 quinine solution. In the extreme cases, some ponds were dried and the soil disinfected with unslaked lime.

(xi) Control of Trichodinasis by 2 per cent to 3 per cent common salt solution, 1:1,000 acetic acid solution and 1:5,000 formalin solution.

(xii) Control of Costiasis with 3 per cent Sodium Chloride solution.

(xiii) Control of Gyrodactylosis with alternate baths of 1:2,000 acetic acid solution and 2 per cent Sodium Chloride solution, dip treatment for 5 minutes in 5 per cent common salt solution and 1:5,000 formalin solution.

(xiv) Control of certain cases of black-spot disease using 3:1,00,000 picric acid for a period of one hour.

(xv) Biological control of *Liqula* infection in Tilaiya reservoir by studying the life cycle of the parasite and then destroying the species of birds which are permanent hosts of the parasites.

(xvi) Control of Argulosis in several stocking tanks by two or three applications of WDP Gammexane at strengths varying between 0:1 to 2 ppm.

3.119. As far as the Institute's research work is concerned, the methods of control of fish diseases have been actually applied in West Bengal, Kashmir and Himachal Pradesh. But the methods must have been applied in other States also, based on the results obtained and published by this Institute.

3.120. During the course of evidence the Committee have been informed that in our country epidemic disease in the case of fish is very rare, because uptil now we have not done intensive farming on a large scale. Fungus or virus attack will become acute, as it has become in China and other countries, only when we start intensive feeding and intensive farming. During all these years there has not been any serious epidemic in the case of fish other than chemical pollution. 3.118A Often large-scale mortality of fishes occurs in tanks and ponds and the fish farmer has to suffer heavy losses. These deaths may be caused by infections of parasites or other agents like bacteria, fungi, etc. With the laying of more emphasis on intensive fish culture, the hazards of such infections have increased. Consequently the fish culturist today is confronted with the serious problems of their prevention and control.

3.121. The Committee understand that studies have been made in fish pathology for the past few years at the Fish Pathology Unit of the Central Inland Fisheries Research Institute, Barrackpore and other centres and some valuable information is now available about several diseases in the fish population.

3.122. **The Committee are glad to note the stops taken by the Central Inland Fisheries Research Institute for combating pests and diseases of culture fishes. They would urge that effective steps may be taken in consultation with the State Governments concerned to popularise among the fish farmers such of the chemicals as have proved effective against the diseases of culture fishes. The Committee also suggest that a programme for training of fish farmers in the application of chemicals, pesticides, etc. in fish culture tanks and ponds may be drawn up in consultation with the State Governments concerned.**

L. Fisheries of Chilka Lake

3.123. Chilka, the largest brakishwater lake, confluent, with the Bay of Bengal, is one of the most important centres of fisheries in

India yielding on an average three to four-and-a-half thousand tonnes of fish. Not satisfied with these results, the Indian fishery biologists are tentalisingly looking forward to making Chilka the most productive and the best managed brakishwater lake of the world.

3.124. Spread over a wide area in the districts of Puri and Ganjam, the pear-shaped lagoon is about 65 km. long and on an average 16 km. wide.

3.125. Rivers Daya and Bhargavi, two branches of Mahanadi river system, meet the lake at its north-eastern end. The lake's single point connection with the sea is made through a narrow 2.5 km. long duct, the outer channel which, at its point of union with the sea is only about 135 metre wide in low tide. The lake is shallow, its maximum depth in summer rarely exceeding 3 metres with vast areas, especially in the north-east, remaining only a few decimetres deep. One monsoons, depending on its intensity, all levels are raised by about 1.5 metre or more.

Salinity of Water and its Inhabitants

3.126. The salient chemical character of the Chilka water, which exercises a selective influence on the kind of fish which inhabit the lake, is its salinity. The average annual salinity of the lake in recent years has ranged between 12.23 per mille to 19.18 per mille. The salinity of the lake varies from region to region and season to season depending upon an interplay of tidal influence on the one hand and fresh-water discharge through the rivers on the other. In monsoons, when there is largely a uni-directional seaward flow of water, the lake is mainly fresh water. Summer months, when evaporation is at its maximum and influx of fresh water minimum, record highest salinities. In other seasons the salinity attains intermediate values.

3.127. No pure, fresh water or pure, sea-water fish normally inhabits the lake except for short durations and that too in restricted areas. Only such species of fish as can tolerate fluctuations of salinity are the proper inhabitants of the lake. While the number of species of fish and prawn which have been recorded from the lake run to 152 and 21 respectively, commercially important forms are only about a dozen, the rest being of academic interest to ichthyologists. Mullets, Clupaids, Perches, Threadfins, Sciaenids and Catfishes among fishes and Panaeids among prawns are the main groups of organisms which form the commercial fisheries of the Chilka

lake. Chilka is, however, best known for its prawn and mullet fisheries, the two groups together often forming as much as half the lake's production.

Uncontrolled Exploitation

3.128. The Committee understand that the fisheries of the Chilka lake have been subjected to an increasing degree of exploitation by indigenous methods of fishing which have been continuously in vogue from ancient times till today. Trade of fresh Chilka fish developed at about the end of the first world war and the exploitation of the fisheries appears to have been intensified after the opening of lucrative export business to Calcutta. The fish production of the lake in the last three decades has varied from 1093.3 tonnes in 1942 to 4455.7 tonnes in 1957. The annual output of the lake during the years 1957—60 has ranged from 25 kg. to 42 kg. per hectare. In recent times, there has developed a belief among local people, that the lake is much depleted of its rich fish population which, should it be found to have actually occurred, need urgent rectification. Even otherwise the need to develop the fisheries of the lake to a level of optimum productivity has been widely felt.

3.129. The matter was discussed between the State and the Union Governments and research activities were intensified in the Second Five Year Plan (1956—1961) leading to the formation of the Chilka Investigation Unit of the Central Ministry of Food and Agriculture.

3.130. The Chilka Investigation Unit was set up to:

(i) investigate whether the fisheries had undergone depletion; and

(ii) Elucidate significant factors relating to the biology of the lake's commercial species and such fishery practices as have a bearing on evolving davelopmental measures to stop up fish production of the lake, to an optimum level of productivity.

3.131. Some of the important findings of the Investigation Unit were that there was no clear cut evidence of depletion of Chilka Lake fisheries, the breeders needed protection, the capture of the fingerlings of Kabla and Dangla should be completely banned, economically important fishes smaller than 6 inches occurring in the catches must be salvaged and the induced breeding of Kabla and Dangla by pituitary harmone administration be developed.

3.132. In a written note the Committee have been informed that "The Government of India have duly forwarded the two reports entitled "Report on the Fisheries of the Chilka Lake, 1957—1960" and "Final Report on the Fisheries of the Chilka Lage (1957—65)" containing the details of the work of the Chilka Investigation Unit, to the Government of Orissa. Probably, the State Government is considering implementation of the recommendations contained in the reports."

3.133. During the course of evidence the representative of the Ministry stated the "The States Directors are kept fully informed of the problems and the functions of these Research Teams. The State Directors are expected to take action in their own States. About the Chilka, the specific lines on which action may be taken have been communicated to the State Governments. Conservation of fingerlings for developing different varieties of fish in the lake and for regulating the fishing as also the emphasis or need for protection of breeding grounds have all been passed on to the State Governments."

3.134. He has further stated that "After all, it is a matter of co-operation and relative priorities which the State Government may give to the various sectors. We also keep liaison with them as to what is happening....Sometime we do go to the field. It is not supervision but in collaboration with them..... The Government of Orissa have taken some action. The action taken is on the propagation side. They have set up some fish farms and on the margin of the Chilka lands they have reclaimed about 2,000 acres of land. Regarding conservation they have been practically helpless because of mass opposition from the fishermen."

3.135. The Committee are glad to note that the problems of the Chilka Lake, an important fishing centre in the country, have been thoroughly studied by the Chilka Investigation Unit set up by the Central Inland Fisheries Research Institute. The study team has made several useful suggestions to prevent depletion of stock as also to step up fish production. The Committee, however, are surprised that no information appears to be available in the Ministry or the Institute as to the action taken by the State Government on the recommendations made by the Investigation Unit. Fisheries research involves a co-ordinated effort of both the Central and State Governments. In this particular case, as investigation was undertaken by a study team appointed by a Central Institute, it was but proper for the Ministry to keep in touch with the State Fisheries Departments to find out what follow-up action has been taken in the light of the suggestions made. In any case, the report should have

been considered by the Central Board of Fisheries and necessary guide-lines given to State Departments of Fisheries as regards the methods to be adopted for preserving the fish stock of the Chilka Lake, considering the importance of Chilka as a source of fish food and the support that it gives to the industry, the Committee would stress that the Ministry may, in consultation with the State Governments, adopt suitable measures for conservation of the Chilka fisheries.

M. Fisheries of Brahmaputra River

3.136. The Committee understand that the problem of fishing in large rivers has not been solved and this is receiving the attention of different countries. In 1965 the Central Board of Fisheries recommended that a Research Unit on river survey for Brahmaputra should be created immediately and sustained efforts should be made to develop suitable methods of fishing with improved crafts.

3.137. Subsequently at the meeting of the Central Board of Fisheries held in 1966 it was agreed that the Government of India (Ministry of Food and Agriculture) should provide necessary facilities for getting fishing boats constructed for this purpose in Assam so that investigation work of the Brahamaputra fisheries could be undertaken as quickly as possible.

3.138. During the course of evidence the representative of the Ministry stated that "The research units which are posted to States are posted under certain arangements. The State provides the boat and other implements and accommodation. The Assam Government has not been able to provide the boat so far. ..... Personally I felt that with a little effort the boat could have been built in Calcutta and transported to Assam."

3.139. Asked to state the present position for establishing the Research Unit on river survey for Brahmaputra and the action taken to render assistance to the Government of Assam for the preparation of a suitable mechanised boat of the required specification for the Unit the Ministry have stated in a written note:

> "In view of the fast flowing nature of River Brahmaputra, it was considered necessary to have a suitable survey vessel before a research unit could be posted to undertake a survey of the river.
>
> Design for a boat was supplied in May, 1964. An estimate was received from Garden Reach on 8.2.1967.

It was ascertained in a personal discussion in November, 1967 from the Director of Fisheries, Assam that a local firm has taken the contract recently."

3.140. The Committee regret to note that Government have not been able to create so far a Research Unit on river survey for Brahmaputra recommended to be set up immediately by the Central Board of Fisheries as early as 1965. There has been considerable delay in finalising the matter and some more time is likely to be taken in the construction of the vessel. The Committee feel that the Ministry, once they were convinced about the usefulness of the project, should have proceeded with speed in the matter and assisted the State Government in getting a suitable vessel for survey purposes. The Committee hope that Research unit on Brahmaputra River Survey would be set up without further delay.

N. Hilsa Fisheries

3.141. The Committee have noted that there are two investigation units on Hilsa Fisheries under the Institute—one located at Barrackpore under the Estuarine Fisheries Research Sub-station (Barrackpore) and the other at Bhagalpur under the Riverine Fisheries Research Sub-Station (Allahabad).

3.142. Asked why it was considered necessary to have two investigation units on Hilsa Fisheries the representative of the Ministry stated during evidence that "Hilsa is a migratory fish. It spends a part of its life in the sea close to the shore, and the remaining part up in the rivers. It has been recorded even as far as Agra and sometimes in Delhi. Its migration from the Bay of Bengal occurs through the greater part of the length of the rivers. The Bhagalpur unit is for work on the riverine stock of the fish. Recent investigations have shown that there are stocks of Hilsa which migrate locally, and do not undertake very long migrations. So, the investigations at Bhagalpur relate to Ganga stocks and the investigations at Barrackpore relate to the Hooghly stocks. ..... The types of fish that inhabit brackish water and fresh water are very different. In brackish water the salinity changes with the tide, and only such fishes which can tolerate wide changes of salinity can survive there. Hilsa can live in sea water, brackish-water and freshwater. In Bhagalpur Hilsa investigations are conducted of fresh water and riverine stocks and since the Allahabad sub-station of our Institute deals with riverine fisheries, we find it better from the scientific point of view to have Bhagalpur under Allahabad rather than under Barrackpore."

3.143. It has been further stated that "It is basically a riverine and estuarine and sea fish. Hilsa occurs in practically all the major

rivers of the country. The migration of Hilsa in the majority of the South Indian rivers has suffered great deal as a result of dam constructions, because they cannot negotiate the dams."

3.144. Asked to state whether any method for controlled breeding of Hilsa had been found out, the representative of the Ministry stated that "no success had been achieved in that."

3.145. The Committee have been informed that the Central Inland Fisheries Research Institute constitutes the National Unit on Hilsa investigations. In fact Hilsa Investigation is one of the twenty priority projects which the Institute has taken up for execution. The Committee understand that a suggestion was made at the meeting of the Standing Fisheries Research Committee held in October, 1957 that a National Committee on Hilsa Investigation might be constituted. The Committee after deliberation resolved that the objective of setting up of separate national sub-committees on Hilsa and Rastrelliger will be achieved by coopting active workers on Hilsa and *Rastrelliger* when these subjects are discussed by the Fishery Research Sub-Committee.

3.146. Considering the importance of Hilsa fisheries, the Committee appreciate the steps taken by the Institute to strengthen research and investigations in this direction. The Committee understand that there are vast Hilsa resources in Godavary river and the Andhra Pradesh Fisheries Department has been conducting investigations on Hilsa Fisheries. The Committee would stress the need for coordination of work carried out by the Central and State agencies so as to avoid duplication of researches. The Committee hope that the data collected by the Institute in connection with maturation, breeding season, migration, age, class, sex composition and food habits of Hilsa Fish would be processed and published for the guidance of State Fisheries Departments.

O. Cold Water Fisheries Unit

3.147. The Standing Fisheries Research Committee at its 5th meeting at Srinagar in July, 1958, having considered the urgent need for investigations on various problems in connection with the development of Trout and other high altitude fisheries, recommended that a Research Unit be established by the Central Inland Fisheries Research Institute. Accordingly the Cold Water Fisheries Unit was set up with headquarters at Kangra in November, 1963.

3.148. The main activities of the Unit have been to control the fish diseases in the trout hatcheries of the Jammu and Kashmir

State; survey of commercially important hill stream fishes and study of their breeding habits in former Punjab, Himachal Pradesh, and Kashmir, assessment of fishery resources of Himachal Pradesh etc. Since further work of the Unit is largely to be in the trout hatcheries of Kashmir, action is being taken to post the Unit itself in Harwan (Srinagar), Kashmir. This Unit is now in the act of shifting from Kangra to Kashmir. The Government of Kashmir is giving full facilities for the conduct of the investigations in their State.

3.149. The staffing pattarn of the unit, is—

Research Officer (Junior)	1
Research Assistant (Selection-Grade)	1
Research Assistant (Ord. Grade)	3
Survey Assistant (Selection Grde.)	1
Junior Survey Assistant	1
Junior Clerk	1
Driver	1
Laboratory & Field Assistant	1
Laboratory Boy	1
Fieldman	1
Fishermen	3

3.150. It has been stated that the programme of work of the Institute is a long-term one and the problems to be studied are:

Problem—1 Assesment of the fishery resources of the cold-water streams of Himachal Pradesh and Punjab (Beas, Sutlej and Chenab and their tributaries).

Problem—2 Trout Investigations:

(a) Location and mapping of important spawning grounds.

(b) Ecological studies of natural spawing grounds with a view to ascertain the optimum requirements for spawning.

(c) Assessment of survival and productive capacity of different spawning grounds; study of biotic and abiotic environmental factors that contribute to survival or mortality.

(d) Intensive studies on the biology with particular reference to food habits, age and growth, fecundity and maturity, diseases and parasites and sex ratio in relation to success of spawning.

(e) Studies on the effects of environmental control on the increase of the carrying capacity of streams and survival of young in spawning streams.

(f) Surveys to locate suitable streams which could be developed as spawning grounds and planting of eyed eggs in streams so located.

(g) Provision of artificial spawning streams to increase recruitment to natural stocks.

(h) Investigations in trout hatcheries:

(i) Studies on diseases with a view to find out suitable methods of control, prevention and cure.

(ii) On the relative merits of different types of feeds and increase in the growth and survival of trout in hatcheries.

Problem—3 Mahseer investigations:

(a) Assessment of Mahseer fisheries in Himachal Pradesh and Punjab.

(b) Studies on the biology with particular reference to food habits, age and growth, facundity and maturity, diseases and parasites and sex ratio in relation to success of spawning.

(c) Location and mapping of spawning grounds.

(d) Detailed studies on the spawning behaviour.

3.151. In regard to the achievements of the Unit, the Ministry have in a written note stated as under:

"(a) Experiments on the use of artificial food were conducted in trout hatcheries at Mahili and Pattikuhal. Three types of artificial food, viz. (a) Wheat Middlings, (b) Barley Powder and (c) Poultry feed were used. In the case of fry and fingerlings, poultry feed, which consisted of Maize, Rice Polish, Fish meal, Bone meal with addition of certain vitamins and antibiotics, was found to be comparatively better. The use of meat and barley mixture in the case of adult fish gave encouraging results.

(b) In order to assess the potentialities of the Mahseer streams and the possibility of their development, survey of Mahseer fisheries in the Kangra Valley was completed.

(c) A detailed survey of Mahseer streams in Himachal Pradesh was completed.

(d) Seed collection centres for Mahseer were located in Kangra Valley. The main centres were Banner Khad near its confluence with Bathu and below Jawalamukhi Railway Station. Jogal Khad below and above Samloti Machchial (Sanctuary), Girj in the lower reaches and Dharam Khad near its confluence with Banner.

(e) *Production of common carp seed:*

November 1963 to March '65	3·8 lakhs of Mirror carp, 68,750 of of scale carp and 1·27 lakhs Mirror Carp, Scale carp and hybrid were produced.
1965-66 . . .	16·3 lakhs Mirror carp, 6,000 scale carp and 41,500 of hybrid between Mirror carp and Scale carp were produced.

(f) Investigations were conducted in the River Beas and its tributaries, Baner, Manjhi, Bethu, Jogal, etc. to study the spawning habits of Mahseer. In the Beas, males measuring from 15.6 to 17.0 cm in length were in oozing condition although the female of even 40.0 cm. length were immature. It is only during the later half of September that post larvae forms were available in Bener, Bethu and Jogal.

(g) Observations on the ecological condition of a Mahseer streams (Baner Khud) in Kangra Valley was completed.

(h) The life history, from advanced egg to post-larval stages of *O. plagiostomus*, *Glyptothorax canirostra* and *N. montanus* were studied.

(i) Fungus infection in Trout hatcheries of Katrain and Kashmir were controlled using malachite green.

(j) Detailed study of food or *Tor putitora* (Mahseer) has been made."

3.132. It has further been stated by the Ministry that the fishing methods in vogue are very much limited, the main gear being the cast net. In certain areas of the Mandi district bordering the Kangra district of Punjab, drag nets are used for fishing in River Beas when the water level is at its minimum. The other gear used

are along lines and rod and line. There are no fish landing or assembly centres and no fish markets. The catches are disposed of individually. However, gill nets are operated by the State Fisheries Department in Gobind Sagar Lake near Bilaspur and the catches disposed of departmentally.

3.153. The Committee have learnt that trout culture was initiated in about 1914 in hatcheries established at Pratapnagar, Kanalla and Kaldyani. Brown trout was introduced in the Tehri water in about 1916 from the hatcheries in Kulu and Kashmir. Some of these trout hatcheries were closed because of their inaccessibility, expense and non-availability of natural and artificial food. Development of fisheries in some of the lakes in Kumaon region was taken up during the First Plan. Under the Third Five Year Plan, U.P. had included a scheme for development of fisheries in the hills of the State and it was proposed to extend the area of stocking by establishing a Mirror carp breeding unit and one trout hatchery and to expand the existing one and its propagation in waters hitherto lying fallow.

3.154. The trout has become acclimatised in the upland waters of the Niligiri plateau, but their population in the hill streams has considerably dwindled and is reported to be very sparse at present. The construction of several hydro-electric projects and submersion of long stretches of the streams, reclamation of catchment and embanking areas, deforestation and other interferences are said to be responsible for this. In Assam, trout culture was introduced in Shillong about 30 years ago but without much success. In Kerala, trout fishery activities are conducted in the Munnar high ranges by a private anglers' association. There is also an excellent hatchery.

3.155. The Committee have come to know that the Mirror carp (Cyprinus carpio) which has established itself as a commercial fishery in the Niligiris and Mysore plateau, has recently been introduced in Himachal Pradesh and U.P. also where it is thriving well but there is further scope for its development. It is quick growing fish which breeds at high altitudes.

3.156. The Committee understand that no large scale production of trout could be effected for want of hatchery and rearing ponds. It continues to be cultured in Kashmir and other places according to methods and techniques introduced in India more than 50 years ago. The Committee are unhappy to note that there has been no significant development of trout fisheries since the inception of Cold

Water Fisheries Unit in 1963. No new techniques and methods appear to have been evolved for the culture of such important fisheries as trout, mirror carp, mahseer, etc. The Committee cannot overemphasise the need for intensive research to provide a scientific basis for the development of trout fishery and other hill fisheries. The Committee also suggest that the question of improving the fishing methods and introduction of new gear to be used in the trout fisheries in the hilly districts of Punjab, Himachal Pradesh and Kashmir may be actively considered by the Ministry. The assistance of the Central Institute of Fisheries Technology may be sought in the fabrication of suitable fishing gear. The Committee also suggest that vigorous attempts may be made for the development of trout and other high altitude fisheries in hilly areas of Uttar Pradesh, Mysore, Kerala and Madras, in consultation with the State Governments concerned.

P. Water Pollution

3.157. The Fisheries Research Committee (1954) had observed as follows:—

> "Pollution of water by industrial and other effluents has a very important bearing on public health, irrigation, agriculture and fisheries and problems connected with it have to be studied on a very broad basis. This can best be done by a separately constituted Central Water Pollution Board, the setting up of which is strongly recommended. Fisheries interests should be adequately represented on this Board.
>
> Fisheries work on this project should be restricted to the collection of accurate and adequate information on pollution as it affects fisheries. If the proposed Pollution Board is not set up in the immediate future, a separate project should be prepared for pilot studies in one or two small areas with selected types of pollution with reference to fisheries."

3.158. The All India Fisheries Conference (1956) had also passed the following resolution:—

> "Having considered the importance of the problems of water pollution by factory effluents as well as sewage with the increasing industrialisation of the country;

Having accepted the recommendation of the Ad Hoc Fisheries Research Committee for the constitution of a Central Water Pollution Board; and

Having considered the desirability of adopting adequate measures on an All India basis to control the pollution of rivers and prevent damage to the fisheries.

Resolved that:

Suitable steps be taken up immediately to study the various problems connected with the pollution of waters by industrial wastes and other effluents and their bearing on fisheries and take suitable remedial measures, as early as possible."

3.159. In a written note the Committee have been informed that studies on the nature of eight types of industrial effluents were made during the past three years. These are Pulp and Paper, Distillery, Yeast, Rubber, Textile, Jute, Tannery and Miscellaneous Wastes such as Paints, Varnish. Chemicals, Shellac, Potteries, Tar, Insecticides, Hydrogenated oil and Soap, Petroleum refinery etc. In two cases, *i.e.* Pulp and Paper and Hydrogenated oil suitable remedial measures were evolved. Other cases are under investigation.

3.160. It has also been stated that cases of stream pollution are either brought to the notice of the Institute by the State Governments or directly observed by the Institute. In either case investigations have been conducted in most of the cases with the help of the State Governments. The State Governments are interested in taking suitable remedial measures to prevent any deleterious effects of pollution.

3.161. Asked to state the steps taken to check pollution of water the representative of the Ministry stated during evidence that "We have not taken any action. The Health Act and the Industrial Pollution Act provide for adoption of remedial measures. These are State laws. About insecticides there was recently a Committee under Prof. Thecker which went into this and their report is just in our hands and we shall be taking up follow-up action on this.".

3.162. The representative of the Ministry has further stated that "it has become extremely difficult to persuade the offending parties to adopt any remedial measures in spite of the two Acts which are prevalent."

3.163. Asked to state the action taken by Government on the recommendations of the Fisheries Research Committee (1954) for setting up the Central Water Pollution Board the representative of the Ministry had added that "..... Before we set up a Water Pollution Board we will need a little time to study the recommendation of this Committee (Insecticides Committee). I understand that the report has just been received ..... within a year, I think, something will be done. But the field is completely in the State Sector."

3.164. The Committee consider that there is an urgent need for making an intensive study of the pollution of rivers, specially the river Hooghly, by the discharge of factory wastes which are considered to have a deleterious effect on fresh water fishes and specially Hilsa fish. They also feel that this is a matter which should receive the most careful consideration of the Public Health, Irrigation and Fisheries Departments of the State Governments concerned. The Committee strongly feel that the Ministry should take early concerted steps for the setting up of a Water Pollution Board in consultation with the State Governments concerned.

Q. Fish spawn prospecting investigations

3.165. The Fish Spawn Prospecting Team (1966) in their report emphasised the need for location of additional high yielding quality seed collection centres. They have highlighted the fact that there are hardly any scientific data on record regarding the qualitative and quantitative potentiality of various spawn-yielding river stretches. The standardised methods of collection and measurement of spawn and the knowledge of spawn behaviour in relation to various hydrodynamical factors are also lacking.

3.166. The Fish Seed Committee (1966) *inter-alia* recommended that:—

> "Intensive exploration of river systems in the various States with a view to locate lucrative centres for collection of seed of desirable species should be taken up immediately, on an organised basis, by the respective State Departments."

The Committee have been informed that extensive experimental observations have been made in this connection by the Central Inland Fisheries Research Institute in the States of Uttar Pradesh, Gujarat, Bihar, Maharashtra and Punjab and valuable results obtained regarding the potentiality of the Centres investigated and

the behaviour of spawn in relation to several hydrodynamical factors.

3.167. The Committee note the studies conducted by the Fish Spawn Prospecting Teams in surveying the potentiality of various spawn yielding river stretches. They would urge that the conclusions drawn from the surveys may be utilised for proper exploration of the fishery resources in the rivers which have already been surveyed.

3.168. The Fish Seed Committee (1966) had recommended that:

"(a) The Central Inland Fisheries Research Institute should take up intensive experiments, with a view to improve the efficiency of the gear used in spawn collections, either by suggesting modifications in the gear in vogue, if necessary, or by evolving new types of gear where required. Special attention must be given to the possibility of collecting spawn from such of these rivers where quality spawn are likely to be available only in deeper regions, because of which the gear presently used for only marginal collections cannot be employed.

(b) Since major carps are known to be among the most desirable species for cultivation, immediate steps should be taken to examine the desirability and feasibility of transplanting these major carps in river systems where they do not occur at present. This work should be taken up by the State Governments."

3.169. In a written note the Committee have been informed that "the Institute has already taken up the problem of improvement in spawn collection gear and evolving new types thereof. Considerable progress has been achieved in the course of the last four years and a gear several times more efficient than the types commonly employed in different States has been evolved and standardised. Further work on this problem is in progress."

3.170. It has further been stated by the Ministry that "investigations on the feasibility of transplanting desirable species of fish and prawns have already been initiated."

3.171. During the course of evidence the Committee have been informed that ".....the private trade in Bihar, Orissa and Bengal of spawn collection is well organised. But it takes some time to take to a new gear. In Uttar Pradesh, Rajasthan and Gujarat, they have taken to the new type."

3.172. The Committee are glad to note that progress has been achieved in this field during the course of the last four years and an improved gear has been evolved and standardised. They would, however, suggest that a suitable type of gear for collecting spawn from deeper regions of the rivers where quality spawn are available should be urgently evolved and standardised.

3.173. The Committee note that investigations on the feasibility of transplanting desirable species of fish and prawn have already been initiated by the Institute. They would suggest that the results achieved in this direction may be published in the Annual Reports of the Institute. The progress of the scheme may also be closely watched by the Central Fisheries Research Committee or the appropriate Committee of the Indian Council of Agricultural Research.

3.174. In this connection the Committee would like to invite the attention of the Ministry to the following recommendations of the Fish Seed Committee (1966):

> "(d) Breeding grounds of major carps should be located and charted out all over the country to enable fuller exploitation of the resources and also to take suitable measures for the protection of breeding grounds.
>
> (e) Hitherto, very little efforts have been made to locate centres of availability of seed of brackishwater fishes. Hence, the concerned State Government should make intensive efforts towards exploitation of such resources. The Central Institute may initiate investigations to develop suitable gear for the collection of brackishwater seed."

3.175. The Committee suggest that feasibility of implementing these recommendations of the Fish Seed Committee may be examined at an early date.

CHAPTER IV

STATISTICAL SURVEYS, EVALUATION AND CO-ORDINATION

A. Fisheries Statistics and Statistical Surveys

4.1. The need for collection of fishery statistics on an all-India level was emphasised by the Fisheries Research Committee (1954) who in their Report had observed as under:—

> "Information on the fisheries of the Ganga system and statistics of fish landings to determine the status of the different fisheries are completely lacking. A sound programme of research on river fisheries can be based only on these data. We recommend that early steps be taken to work out a system of collection of fisheries statistics. The work may be started on pilot scale at one or two selected centres and, when the methods have been developed, the fisheries survey may be extended to the major centres of production. This work should be planned in consultation with the Statistical Division of the Indian Council of Agricultural Research and the Survey Section of the Central Marine Fisheries Research Station.
>
> The Committee attach much importance to this work and consider that it would be desirable to initiate the programme, if possible, even before the end of the First Five Year Plan so that preliminary work will have been completed and staff recruited and trained before the commencement of the Second Five Year Plan."

4.2. In a memorandum No. AIFC/TE-IX(d) circulated at the All India Fisheries Conference (1956) it has been stated: "At present practically no all-India Fisheries Statistics exist with respect to either of the two categories (Marine and Inland). In view of the importance of the collection of Fisheries Statistics as a prerequisite for any proper development of fisheries the Government of India appointed a Technical Committee for the Coordination of Fisheries Statistics in 1950 in pursuance of the recommendations of the All-India Fisheries Conference 1948. This Committee went in detail into the question of collection of Fisheries Statistics and made re-

commendations regarding the scope of the data to be collected. The substance of the detailed recommendations made by the Committee was that the problem of improving fisheries statistics and of placing them on a sound basis involved:—

(a) development of suitable methods for the collection of reliable and accurate data;

(b) the employment of these methods by the States with the help of their existing administrative machinery *viz.* Departments of Fisheries, Revenue, Agriculture, Irrigation, Public Works, Marketing and Cooperation; and

(c) compilation, analysis, interpretation and publication of the fisheries statistics on an all India basis by the Ministry of Food and Agriculture at the Centre.

Though the recommendations of the Committee was generally accepted, the position regarding collection of fisheries statistics has not improved much. In view of the pressing need for these statistics at the present juncture, it is essential that all possible steps are taken for their collection immediately."

4.3. The need for developing suitable techniques for estimating inland fish production was emphasised at the All India Fisheries Conference (1956). The Conference resolved that:

"(1) steps be taken by the Directorate of National Sample Survey to expedite development of suitable techniques for the estimation of catches, particularly for inland fisheries;

(2) for bringing out the main features of the Fisheries economy, the Directorate of National Sample Survey undertake quinquennial socio-economic surveys;

(3) the Directorate of Economics and Statistics in the Ministry of Food and Agriculture organise collection of regular data on economic and Commercial Intelligence pertaining to fisheries and potential resources in the States;

(4) the State Governments examine the possibility of licensing all fishing craft and gear (with nominal fees or without fees), as a means of obtaining fishery statistical information relating to potential resources;

Till the finalisation of the techniques by National Sample Survey for the estimation of inland fish catch, the State

Governments may endeavour to furnish approximate estimates of inland fish catches based on fishing units;

(5) the existing Central and State Fishery Organisations continue and expand their activities for the collection of fishery statistical data and new schemes for the collection of satististics be developed in areas not covered by existing work;

(6) while States with adequate fishery organisation may utilise them for collection of data, other States may collect information through other departmental agencies or through village level workers in the National Extension Service blocks and Community Projects areas;

(7) the Central and State Governments evolve suitable proformae for this purpose, lay down procedures and develop suitable yardsticks;

(8) the collection of fisheries statistics in the States on a uniform basis be co-ordinated by the Central Ministry of Food and Agriculture. The Directorate of Economics and Statistics will be responsible for the publication and dissemination of statistical information on fisheries; and

(9) the Resolution envisaged above may be implemented as early as practicable, so as to ensure the availability of fishery statistics on an All-India Scale during Indo-pacific Fisheries year, 1957-58."

4.4. Asked to state the action taken in pursuance of the recommendations of the Fisheries Research Committee, the Ministry in a written note have stated: "The pilot scale survey was initiated by the Directorate of National Sample Survey and the work was taken up independently in conjunction with State Fisheries Departments. The reports have indicated the possibility of assessing production in tanks by sampling."

4.5. In another note furnished to the Committee it has been stated that "As some knowledge of the fish abundance in rivers and estuaries which form a major source for fish stocks in dams, reverine fish spawn, exploratory fishing in Sunderbans, etc. is *sine qua non* for sustained fish yield, fish catch statistics of selected rivers and estuaries is also included in the work of the Institute but at a low priority level."

4.6. Asked to state the reasons for according low priority in the research schemes to collections of fish catch statistics of the rivers and estuaries the Committee have been informed in a written note that "The problems relating to the scientific development and management of the natural fisheries of rivers and lakes are much more complex and their elucidation much more time-consuming than those pertaining to confined waters. Hence, it has been necessary to give higher priority to culture fisheries projects which have immediate applied value. The fisheries of Reservoirs despite their being connected to rivers have great scope for quick development and so this problem has also been accorded a higher priority. Similarly, Riverine spawn prospecting investigations have been given a very high priority for similar reasons. Collection of catch statistics from rivers and estuaries is also being continued, but in view of the necessity to develop the country's fisheries resources in the shortest possible time projects relating to culture fisheries have been given relatively higher priority."

4.7. During the course of evidence the representative of the Ministry has stated that ".....the Central Institute's priority problem has been to evolve such techniques as will give more production per acre in an economical way. It is different from the Marine Institute in this matter. The Central Institute is concerned only with the technical aspects.....The Survey part, potentiality and actual development are not the responsibility of this Institute. The Institute in a selected typical reservoir develops certain techniques . . . It will categorise water areas and develop techniques. The Institute will not collect a complete picture of the resources... We have passed on this problem to the National Sample Survey. They have done a pilot analysis and then the methodology has been under discussion. The statistical experts amongst themselves are discussing. They have no standardised methodology. It has to be sampling and it cannot be complete enumeration. Certain patterns have been laid out for this sample survey, but the experts do not agree. We are hoping that they will be able to improve their methods."

4.8. The Committee wanted to know how in the absence of sample surveys places with vast potentialities were identified. The representative of the Ministry stated that some regional surveys have been done. In a written note it has been stated that surveys on availability and production of fish have been conducted only in selected regions of the country. All-India survey from the viewpoint of estimating total production does not come within the purview of the aims and objects of the Institute and hence, have not

been undertaken. Institutions like Directorate of National Sample Survey are in a more advantageous position to do so and probably have initiated preliminary surveys in that direction. Surveys have been conducted by the Central Inland Fisheries Research Institute in Ganga River System, Narbada-Tapti, Hooghly-Matlah Estuary, Mahanadi Estuary, Chilka Lake and Pulicat Lake.

4.9. The regional surveys in the Ganga River System have indicated that there is no depletion of fish. A similar picture has been obtained for Norbada, Tapti and Godavari Rivers. Regarding Hooghly and Mahanadi estuaries, the survey indicates that increase in fishing effort is necessary. This is being attempted by the State Directors. Chilka Lake Fisheries also do not indicate depletion and some measures have been recommended for increasing production. These have been taken note of by the State Director. Results of steps of Pulicut Lake are not yet conclusive.

4.10. The Committee attach considerable importance to collection of fisheries statistics and survey of available inland waters so that planned action could be taken to step up resources. They are unhappy that although a decade has passed since the All-India Fisheries Conference adopted a resolution on the subject, no effective steps have been taken by the Ministry for collection of statistics relating to Inland Fisheries on a scientific basis. They would suggest that the Institute of Agricultural Research Statistics of the Indian Council of Agricultural Research may, in conjunction with the National Sample Survey, evolve suitable techniques for conducting surveys from the point of view of estimating total production of fish on an All India basis.

4.11. The Committee note that the Institute is also collecting catch statistics from selected rivers and estuaries, but the work has been accorded a low priority. They would suggest that the Institute should co-ordinate their efforts with those of the National Sample Survey so that a methodology may be laid down for a scientific enumeration of fish catches on a country-wide scale.

B. Liaison

(i) *Liaison with Universities*

4.12. The Committee on Fisheries Education (1959) had emphasised that:

> ".....initial training in basic research should continue to be with the Universities and academic institutions and the

recent efforts of the Ministry of Education and the University Grants Commission to strengthen fundamental research in University Centres in physical and natural sciences are a necessary and wholesome development."

4.13. Asked to state the proportion of total research effort of the Institute in terms of manpower and money devoted to basic research and applied research the Ministry have stated in a written note that there is no basic research being done in the Institute. The entire work programme of the Institute is production-oriented and falls under the category of applied research.

4.14. During the course of evidence it has been state that "..... I think that is our understanding also that the University should deal with basic research. Now that the Indian Council of Agricultural Research has taken it up they will co-ordinate research farming out problems to various States, so that there will be better control of research."

4.15. It has further been stated that "The universities are requested to give proposals to the Indian Council of Agricultural Research which finances such projects. There again the Chairman of the Research Committee is also there on the other Committee of Indian Council of Agricultural Research where such schemes are discussed."

4.16. The Committee would suggest that the universities having departments of Zoology should be increasingly associated with the Institutes of fisheries in general and Central Inland Fisheries Research Institute in particular in the solution of problems of fundamental nature relating to fisheries. They hope that the Indian Council of Agriculture Research, which gives grants to research institutes and to universities, will farm out certain projects to universities on a continuing basis. Problems of applied nature may be entrusted to the Central Inland Fisheries Research Institute and State Research Institutes for solution.

(ii) *Liaison with other Research Institutions and States*

4.17. It has been stated that all the Sub-Stations of the Institute are in close liaison with the Fisheries Departments of the particular States in which the Sub-Station|Unit|Centre are situated. Since the research programme of the Institute is always reviewed by the Fisheries Research Committee which includes Directors of the State Fisheries Departments, provision already exists for close liaison with the States. In several instances, as for example in the Pond

Culture studies, Spawn Prospecting Investigations, Reservoir Investigations, Estuarine Investigations. etc. collaboration with the State Department for many of the projects taken up, is effected at different levels.

4.18. Two projects, one on commosite culture of fishes ponds located in different soils of the country and another on relationship between food and fat contents of corp breeders, are proposed to be taken up in different States as co-ordinated research programmes.

4.19. The Committee are glad to note that sub-stations of the Institute are in close liaison with the Fisheries Departments of the particular States in which the sub-stations are located and that some of the research projects undertaken by the Institute are implemented in collaboration with State Fisheries Departments. The Committee would, however, stress that the Institute should also maintain close and direct liaison with other Research Institutes dealing with fisheries in India and abroad.

C. Evaluation of Research Work

4.20. Asked to state the level at which the results of investigations emanating from the various Sub-Stations, Centres and Units are evaluated the Ministry in a written note furnished to the Committee have stated that the results of investigations emanating from the various Units are evaluated initially by the Officer-in-Charge of the Sub-Station to which they are attached and later by the Director (in the case of Units not attached to any Sub-Station, the evaluation is done by the Director).

4.21. The results from the Sub-Stations and ancillary units are evaluated by the Director, the Ministry and the Fisheries Research Committee. If the Projects in question are under the charge of any of the Officer-in-Charge of Sub-Stations, he scrutinised the findings regularly. These are further scrutinised by the Director both on the basis of on-the-spot inspections and on the basis of reports received at Headquarters regularly. In the case of Officers working immediately under the Director, the scrutinising is done directly.

4.22. At the Headquarters the co-ordination and processing of results of research is done by the Director with the help of Senior Officers, at Headquarters. The Documentation Units compiles the

various reports received and submits them to the Director. There is a Scientific Assistant at Headquarters to help in the compilation work.

4.23. While noting the present arrangements for evaluation of the research work by the Director and the Officers-in-Charge of the Sub-Stations, the Committee would like to suggest that a periodic evaluation of the work of the Institute may be conducted by an Achievement Audit Committee consisting of specialists. In this connection, the Committee would like to invite the attention of the Ministry to recommendation made by them in para 9 of their 76th Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Agricultural Research Institute.

D. Extension Activities

4.24. In a Memorandum [No. AIFC/TE/IX(C)] circulated at All India Fisheries Conference, Madras (1956) it has been stated:

> "The major responsibility for conducting research and exploratory work rests with the Central Government. Considerable advances are being made in the methods of fish production and utilisation through research, exploration and experimentation both in India and foreign countries. But the application of the results of these researches has suffered on account of the lack of a suitable liaison agency. To fill this need the Central Government is establishing a chain of Fisheries Extension Units in the country."

4.25. In a written note the Committee have been informed that ten Fisheries Extension Units were started in 1956-57 with a view to extending the results of research achieved in Fisheries Research Institutes to the fish-farmers, fisheries cooperatives and fish processors. These units conducted extension work through result and method demonstrations, publication of pamphlets, group-discussions, organisation of training courses, participation in exhibitions, conduct of audio-visual publicity etc. However, as a measure of economy, these units were wound up with effect from 31-3-1967. There is, however, an extension unit attached to the Central Institute of Fisheries Technology, Ernakulam.

4.26. It has been stated that the Research Institutes are publishing bulletins, news-letters and other handouts embodying information of extension value.

4.27. Asked to state how the results of investigations and researches made by the Central Inland Fisheries Research Institute, Barrackpore are brought to the notice of the fishermen, the fishery industry and other organisations concerned with inland fisheries for proper exploitation by them, the Ministry have stated in a written note:

(i) Special training courses are periodically conducted in which Extension workers, State officials etc. participate. In these courses training in research methodology evolved by the Institute is imparted, resulting in dissemination of the knowledge to different parts of the country.

(ii) Field investigations are conducted in different parts of the country in collaboration with the States concerned, taking the help of local fishermen, labourers, etc., which results in immediate transmission of results achieved in field investigations.

(iii) Demonstrations are given in State and Private fishery waters on certain especialized items of work such as weed control, control of diseases, etc.

(iv) Technical advice accompanied by field demonstrations are given to public fish farmers whenever any such requests is received.

(v) The Institute's progress reports, bulletins, and other publications containing the results of research are regularly sent to different States which are the actual agencies for fishery development of the waters in their territories.

(vi) The Institute runs a one-year training course to which State nominated and private candidates as well as foreign trainees are admitted. Up-to-date and latest results of research are taught to the trainees.

(vii) Articles on selected technical fishery matters in popular language are published in appropriate magazines, journals, etc.

(viii) Important fishery developmental activities developed through research conducted in the Institute have been filmed as documentaries and shown to public.

(ix) Selected activities of the Institute incorporating important findings have appeared in vernacular and English newspapers. Radio talks in some of regional languages have also been given.

(x) The Institute has participated in several all-India as well as regional exhibitions, where the techniques developed have been demonstrated to the public.

4.28. Asked to state whether the results of investigations are published in regional languages of the areas where the investigations, surveys etc. are conducted, the Ministry have stated that the results are not published in regional languages by the Institute.

4.29. During the course of evidence the representative of the Ministry has stated that—

"We feel that extension should be strengthened and extension coordination with the State extension wings should also be strengthened and there should be a link up between extension and research. We have developed this on the agricultural side to some extent. We will try to follow similar methods here also. In fisheries it will be more limited. Where there will be scope for fishery development, either coastal or inland we will do it. The extension wing here was closed in 1967. It was rather a step in the wrong direction when in parallel. We were going with Indian Council of Agricultural Research taking up research and extension work and extending it further on the agricultural side."

There is no regular machinery. We would like to have a proper tie up at the various levels....Some States now feel that Fishery is certainly very important. And they have tried to build up their own fisheries organisations."

4.30. He has further stated: "We are aware of this lacunae in this field and we are trying to build up our own organisation."

4.31. Asked to state whether any useful dialogue has been started with the State Governments regarding the strengthening of the extension side as well as the directorates of fisheries, the representative of the Ministry has stated that "we have not yet started the dialogue in that intensity. But we do propose to do that."

4.32. A note on the extension activities of State Governments is given in Appendix VIII.

4.33. The Committee are unhappy that having set up a chain of extension units for dissemination of results of researches carried out by the Central Fisheries Research Institutes the Ministry considered it necessary to wind them up as a measure of economy. In the opinion of the Committee, this step was a retrograde one. Research cannot be carried out in isolation. It is essential that the benefits flowing from research should be made available to the fishermen who require to be enlightened about the latest scientific techniques for the exploitation of fishery resources. The Committee, however, note that the Ministry is contemplating to set up a proper extension machinery on the same lines as agriculture. The Committee hope that the Institute as well as the Indian Council of Agricultural Research would, in cooperation with the State Departments of Agriculture, devise effective machinery to ensure that the results of practical value emerging from the research activities of the Institute are systematically and speedily transmitted to the fish farmers on a more extensive and countrywide scale. The Committee suggest that the Institute may arrange to publish research results in the form of attractive pamphlets in popular styles and send them to State Governments Farmers' Organisations and other concerned agencies. Instructional films depicting improved methods and advances in fisheries and the advantages flowing from them should be prepared and widely displayed in rural areas. Arrangements should also be made for giving publicity in improved practices, fishing gear and equipments, etc. at fairs and exhibitions held in the country-side.

E. Exchange of Information

4.34. In his Research Evaluation Report (1961) on the Central Inland Fisheries Research Station, Prof. H. S. Swingle had made the following suggestions:

> "research staff should be brought together for periodic meetings to discuss common problems. This is essential for the proper understanding of the problems of greater importance in fisheries and to keep them abreast with current research and achievements.....The place of meeting should be changed from year to year to various Research Stations and/or sub-stations so that each staff member will become familiar with the current research methods and equipment."

4.35. Asked to state whether this recommendation has been implemented and, if so, the number of seminars and symposia held during the last six years, the Committee have been informed in a written note that during 1964 a meeting of all officers-in-charge of Research Projects/Problems were asked to meet at Barrackpore to discuss the various investigations in progress and to formulate new programme of work. The Fisheries Development Adviser to the Government of India was also present during the meeting. Since a meeting of the Fish Seed Committee was also arranged at that time some State Directors of Fisheries also expressed their views regarding the revised programmes of the Institute.

4.36. Further meetings had to be arranged at Sub-Stations or Units only due to the paucity of T.A. Funds. For this purpose the Director or Senior Officers-in-Charge held discussions on the respective programmes of work during their visits to the Sub-Stations/ Units.

4.37. For preparing the programme of the re-oriented projects (in 1956) the Director held meetings with research workers at Barrackpore, twice at Cuttack, twice at Allahabad, once each at Tungabhadra Dam, Bangalore, Ponneri, Kangra, Srinagar, Rewa, Kakdwip and Calcutta.

4.38. The Fisheries Research Committee also regularly invited the research workers interested in particular field or problem to hold discussions in the Committee. The Committee has set up Five Working Parties on important subjects on which seminars are likely to be held based on the results of the findings of the working parties.

4.39. The fisheries workers have participated in Seminars/Symposia held by the Marine Biological Association on three occasions, once by the Indian Ocean Expedition, once by the National Institute of Sciences of India, once by the Zoological Society of Bengal, once by the Fisheries Technological Society, once by the Indian Council of Agricultural Research in collaboration with National Institute of Sciences of India.

4.40. Several contributions have been sent by the research workers to the Indian Science Congress meetings and many of the contributors have participated in the discussions of the Congress.

4.41. The Director and Officers-in-Charge of Capture Fisheries Investigations met at Barrackpore in 1967 to discuss the new programmes of work.

4.42. The Committee attach considerable importance to periodic meetings of the research workers employed in the Central Inland Fisheries Research Institute as also in the various State Research Institutes for discussion of common problems and exchange of information relating to fisheries research being conducted by them. The Committee suggest that arrangements may be made for holding periodic meetings of the research workers of Central and State Research Institutes in various research stations/sub-stations by rotation.

CHAPTER V

TRAINING FACILITIES

A. Training course in inland fisheries

5.1. The Central Inland Fisheries Research Institute is conducting a training course in inland Fisheries at Barrackpore. This training course is mainly intended to train junior technical staff of the various State Fisheries Departments. A small number of private candidates who intend to take up private employment or develop fisheries in their own States and a few from other countries are also admitted, according to demand. Advertisement inviting applications from qualified private candidates are published through leading daily news papers in different parts of India. A panal with the list of qualified candidates, in order of merit, is prepared and the selected candidates, are asked to join the course. The names of the foreign candidates are forwarded by the Ministry with the relevant information regarding their qualifications, experience, age, health etc. for scrutiny by the Director. Director's acceptance or otherwise is communicated to the Ministry. These requests emanate from the F.A.O. generally. No specific quota is reserved either for private trainees or foreign candidates.

5.2. The Committee have been informed that the Training course at the Institute has been put under the administrative control of the Central Institute of Fisheries Education, Bombay.

5.3. Asked state the reasons for the transfer of the course it has been stated by the Ministry that this has been done in pursuance of the recommendations of the Fisheries Education Committee (1959) which stated that when the Central Institute of Fisheries Education is established, the responsibility for this course should also vest with the Head of the Central Institute. The position now is that instead of the Director, Central Inland Fisheries Research Institute, the Director, Central Institute of Fisheries Education controls the training course at Barrackpore.

5.4 It has been further stated that it would be in the fitness of things if all fisheries education institutions are administered by the Central authority and that the expansion of the inland fisheries course

proposed by the Fisheries Education Committee can be properly implemented by the Central Institute of Fisheries Education.

5.5. The Committee note that the training course in the Institute is now controlled by the Director, Central Institute of Fisheries Education, Bombay. The Committee hope that the training would continue to be imparted at Barrackpore so as to meet the special needs of States in the eastern region where a large number of persons trained in inland fisheries is required.

B. Admissions

5.6. The Committee have been informed that the admission to the training course depends upon the number of candidates deputed by the different States and foreign countries from year to year and availability of suitably qualified private candidates.

5.7. It has been further stated that circular letters with copies of current rules of the Training Course giving details of the terms and conditions of admission and prescribed nomination forms are sent to all State Governments and Union Territories well in advance with the request to forward their nominations within a specified time. As soon as the nominations are received the details of qualifications, age, experience, etc. are scrutinised by the Director and the acceptance is communicated.

5.8. Action is taken in advance by the Institute so that the State Governments can nominate the candidates early. Reminders are also sent to expedite the nominations in cases of delay.

C. Intake Capacity

5.9. The Committee have been informed that the present intake capacity of the Institute for training in Inland Fisheries Training Course is 44, limited both by hostel accommodation and staff position.

5.10. The trainees have to pay a tuition fee of Rs. 40 per month. They receive a stipend of Rs. 75 per month from the sponsoring State Governments. The Central Government meets 50 per cent of the expenditure incurred on the trainees.

5.11. As regards foreign trainees, it has ben stated that the expenditure on such trainees is borne by the respective foreign Governments.

5.12. The total annual amount of training expenses which are deposited with the Director, by the State Governments in advance, is as follows:—

	Government deputee
Stipend at Rs. 75/- a month	Rs. 900
T.A. Charges	Rs. 1,399
Tuition fee at Rs. 40/- a month	Rs. 480
Lodging fee at Rs. 15/- a month	Rs. 180
Security Deposit	Rs. 100
	Rs. 2,960

5.13. The trainees also receive their usual pay and allowances in addition to their stipend.

5.14. A statement showing the number of persons from different States in India/abroad trained in the Institute since inception of the training course is given in Appendix IX.

5.15. The Committee have noted that except during 1965-66 the intake capacity of 44 has not been utilised since the inception of the training course. Asked to state the reasons for non-utilisation of this intake capacity during the last seven years the representative of the Ministry has stated during evidence that:—

> "The minimum qualification was a graduate and in 80% of the States the scale of pay which are prescribed for Fisheries Officers were much lower than what were prescribed for Animal Husbandry or Agriculture. It is extremely difficult to persuade B.Scs. to come for training course and serve for Rs. 150/-. But after the States had revised their scale of pay, this position has improved considerably."

5.16. The Committee, however, note that the position far from improving has actually deteriorated inasmuch as there were only 32 trainees during the year 1967-68 as compared to 43 trainees during 1966-67. When asked to explain the reasons for this downward trend, the representative of the Ministry has stated that the State Government have not been able to depute sufficient number of trainees due mainly to paucity of funds.

5.17. The Committee are unhappy that the facilities available in the Institute for training in inland fisheries have not been fully utilised. In view of the fact that the number of trainees is coming down from year to year, the Committee suggest that the causes of this downward trend may be thoroughly examined and suitable remedial measures taken in consultation with the State Governments, whose responsibility it is to sponsor candidates for the training course.

D. Teacher-pupil ratio

5.18. The Committee have been informed that the entire inland fisheries training is treated as one course consisting of different subjects, like induced breeding, stream pollution, weed control, craft and tackle, etc. bearing on inland fisheries development. The theoratical and practical classes on these subjects are dealt with by the four members of the training staff, two of the status of lectures and two demonstrators. The teacher student ratio, therefore, works out to be 1: 22 in respect of lecturers and demonstrators each.

5.19. It has been further stated that the teacher pupil ratio is not considered reasonable. The Fisheries Education Committee had recommended seven teaching staff for sixty candidates.

5.20. The Committee, however, have been informed during the course of evidence that apart from the training imparted by the regular training staff of the Institute, lectures are also delivered to the trainees by the specialists of the Institute as well as the State Departments of Fisheries.

5.21. Considering the present intake of students, the Committee think that the strength of the teaching staff is adequate. Although the training course has now come under the control of the Central Institute of Fisheries Education, the Committee hope that the research staff of the Central Inland Fisheries Research Institute would continue to deliver lectures on important subjects, pertaining to inland fisheries to the trainees.

CHAPTER VI

FINANCE

A. Budgeting

11. A statement showing the financial performance against the Plan provisions may be seen at Appendix X. It will be seen that during the three Plan periods large amounts of funds have remained unutilised. The Committee hav been informed that most of the un-utilised funds during the three Plan periods were those earmarked for the construction of buildings and Fish Farm which could not be either taken up or completed during the respective period due to administrative reasons. As regards unutilised funds under Revenue Account, a good number of plan posts remained unfilled due to reasons like administrative delays, bans imposed from time to time in filling up posts, non-availability of suitable candidates through Employment Exchange, etc. Asked to state the administrative delays due to which the funds could not be utilised the Ministry in a written note have stated as under:—

"1960-61

The acquisition of land at Kakdwip was effected only late in the year after prolonged efforts and preparation of estimates for construction of laboratory, ponds etc. was in progress. Hence funds for construction was not required during the year.

1961-62

Land acquisition for pond culture unit at Chowduer (Orissa). construction of Fish Farm, Laboratory and office buildings for which allotment was made did not materialise as the Orissa Government could not make the proposed land available.

1962-63

Construction of some additional residential quarters and fish ponds were postponed in view of economy.

1963-64

Construction of residential quarters, work-shop, garrage, Electric Installation Development of Cuttack Sub-Station were still under consideration and the proposals did not materialise.

1964-65

The saving was due to the fact that C.P.W.D. was unable to undertake works relating to the Laboratory building at Kakadwip Fish Farm and Type IV quarters at Barrackpore.

1965-66

(1) The revised estimate of Type IV quarter was yet to be finalised by the Central Public Works Department.

(2) Out of the allotment of Rs. 1,50,000 for Experimental Fish Farm and Training Centre at Panna debits amounting to Rs. 55,085.55 was accepted for transfer of land including buildings. This debit could not be raised by the Accountant General (Madhya Pradesh) within the financial year.

6.2. Asked to state whether the unutilised funds could not be utilised for some other projects for increasing the fish production, the representative of the Ministry has stated during the course of evidence that "we could not utilise it elsewhere because we did not need funds for any other project." He has admitted that "There was a lacuna in the planning and budgeting of this expenditure. We have now got a month to month examination of this by the Joint Secretaries in the various Divisions. If in one Division, there may be some savings, we take it over in another Division and we try to utilise the funds. Funds are scarce now and we have to use every bit of it now. It may not be spent on fisheries it may be spent or may be something else. But we have already followed this procedure for the last one year."

B. Project-wise Allotment of Funds

6.3. The Committee feel that some of the reasons indicated for delays in execution are such as could have been avoided by better planning and execution. They are, however, glad that steps have now been taken for proper utilisation of the funds.

6.4. The Committee have been informed that so far there were no separate budget allotments for the Sub-Stations. The Institute had a centralised budget. Arrangements are now being made for project-wise allotment of the budget from 1968-69 onwards.

6.5. During the course of evidence the representative of the Ministry has explained that in the past lump sum grant had been given to the Institute and the utilisation of the grants was on the basis of the work allotted to the different Sub-Stations and the problems which they were handling. It has now been realised that it would

be better if the funds are allotted project-wise inasmuch as the entire work programme of the Institute has been re-oriented into twenty projects.

6.6. The Committee note the proposal of the Ministry to allocate funds according to the projects to be undertaken by the Institute. The Committee suggest that alongside project budgeting, the Ministry should also conduct periodically an assessment of the progress made in respect of each project with a view to see whether the monies sanctioned for a project are being well laid out.

P. VENKATASUBBAIAH,

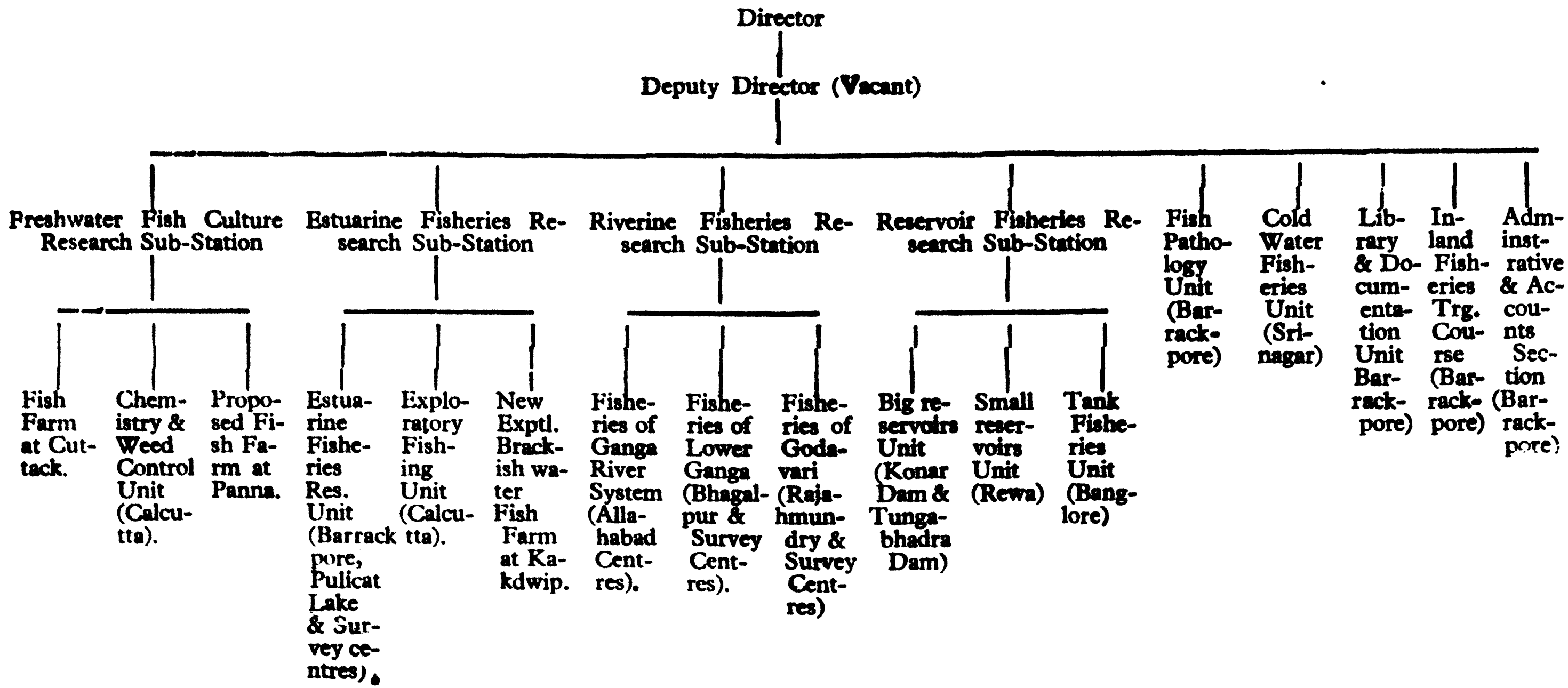
Chairman,
Estimates Committee.

NEW DELHI;
February 24, 1968.
Phalguna 5, 1889 (*Saka*).

APPENDIX I

(*Vide* para. 1.22)

Organisational set up of the Central Inland Fisheries Research Institute, Barrackpore



APPENDIX II

(*Vide* para 1.28)

List showing the names and location of various sub-stations, units etc.

Pond Culture Division

Sub-Station	*Farm*
Central Inland Fisheries Research Sub-Station, 19, Cantonment Road, Cuttack-1, Orissa.	1. Killa Fish Farm, Cuttack, Orissa. 2. Experimental Fish Farm (proposed) of the Central Inland Fisheries Research Institute, Dist. & P.O. PANNA, Madhya Pradesh.

Riverine Division

Sub-Station	*Units*	*Survey Centres*
1	2	3
Central Inland Fisheries Research Sub-Station, 30, Pannalal Road, Allahabad, U.P.	1. Krishna-Godavari Unit, Danvaipet, Rajahmundry-3, A.P. 2. Hilsa Fisheries Unit of the Central Inland Fisheries Research Institute, Khanjarpur, Beatson Road, Bhagalpur-1, Bihar.	1. Ganga Fishery Survey Centre of the Central Inland Fisheries Research Institute, B-26/106, Nawabganj, Varanasi, U.P. 2. Ganga Fishery Survey Centre of the Central Inland Fisheries Research Institute, Japlingunj, Bailia, U.P. 3. Ganga Fishery Survey Centre of the Central Inland Fisheries Research Institute, 111/369 Harsa Nagar, Kanpur, U.P. 4. Ganga Fishery Survey Centre of the Central Inland Fisheries Research Institute, 4/123 Boilonganj, Agra-1, U.P.

1	2	3
		5. Central Fisheries Survey Centre, Mithapur, Patna, Bihar.
		6. Ganga Fishery Survey Centre, P.O. Buxar, Dist. Sahabad, Bihar.
		7. Hilsa Fishery Survey Centre of the Central Inland Fisheries Research Institute, P.O. Lalgola Bazar, Dist. Murshidabad, West Bengal.

Lacustrine Division

Sub-Station	*Units*
Central Inland Fisheries Research Sub-Station, KONARDAM, Hazaribag, Bihar.	1. Tank Fisheries Research Unit of the Central Inland Fisheries Research Instt., IIIrd Floor, Multistoreyed Building, K. R. Circle, Bangalore-1, Mysore State. 2. Small Reservoir Unit of the Central Inland Fisheries Research Institute, Near Water Tank, Katra Rewa, Madhya Pradesh.

Estuarine Division

Sub-Station	*Units*	*Survey Centres*
1	2	3
Estuarine Fisheries Research Sub-Station BARRACKPORE, West Bengal.	1. Pulicat Unit of the Central Inland Fisheries Research Institute, 2/250 Hariharan Bazar, P.O. PONNERI, Dist. Chingleput, Madras State. 2. Estuarine Fisheries Research Unit, 47/1, Strang Road, Calcutta-7.	1. Estuarine Fishery Survey Centre, P.O. KOLAGHAT, Dist. Midnapore, West Bengal. 2. Estuarine Fishery Survey Centre, P.O. DIAMOND HARBOUR, Dist. 24-Parganas, West Bengal.

1	2	3
	3. Estuarine Fisheries Research Unit, P.O. KAKDWIP, Dist. 24-Parganas, West Bengal. (Farm under Construction)	3. Estuarine Fishery Survey Centre, P.O. CANNING TOWN, Dist. 24-Parganas, West Bengal.
		4. Estuarine Fishery Survey Centre, P.O. HASNABAD, Dist. 24-Parganas, West Bengal.
		5. Estuarine Fishery Survey Centre, P.O. RAIDIGHI, Dist. 24-Parganas, West Bengal.
		6. Estuarine Fishery Survey Centre, P.O. NAMKHANA, Dist. 24-Parganas, West Bengal.
		7. Estuarine Fishery Survey Centre, Vill. Thakurpara, P.O. KALNA, Dist. Burdwan.
		8. Estuarine Fishery Survey Centre, P.O. NAZATHATKHOLA (KALINAGAR) Dist. 24-Pargana, West Bengal.
		9. Estuarine Fishery Survey Centre, P.O. & Vill. ULUBERIA, Dist. Howrah, West Bengal.

APPENDIX III

(*Vide* Para 2·5)

Statement showing the number of scientific, teaching, administrative and other technical and non-technical posts

Scientific		Teaching		Administrative		Other Technical		Other non-technical Class IV	
(1)		(2)		(3)		(4)		(5)	
As on 1-4-1965									
Director	1	Chief Training Superintendent.	1	Administrative Officer	1	Sr. Artist	1	Laboratory Boy	24
Deputy Director	1	Fisheries Training Superintendent	1	Accounts Officer	1	Photographer	1	Fieldman	46
Senior Research Officer	7	Asstt. Fisheries Training Supdt.	2	Superintendent	2	Artist Photographer	1	Gestetner operator	1
Research Officer	16			Store Keeper (Sr.)	1	Computor	1	Book Binder	1
Assistant Research Officer	23			Head Clerk	1	Librarian	1	Khansama	1
Research Assistant. (Selection Grade)	14	*Senior Accounts Clerk	1	Accountant	1	Scientific Assistant	1	Aquarium Attendent	1
				*Senior Clerk	8	Ref. collection Assistant	1	Boat Driver	1
Survey Asstt. (Selection Grade)	6			Sr. Store-keeper clerk	2	Survey Asstt. Jr.	27	Daftry	1
Research Asstt.	69			Stenographer	4	Lab. & Field Asstt.	22	Deck Tindel	2
Survey Asstt.	32			Cashier.	1	Artist.	1	Deck Sukhany	2
				Store-keeper Jr.	2	Bosun	1	Peon	35
				Junior Clerk.	35	Asstt. Engine Driver	1	Watchman	20
				Store clerk	1	Mechanic (150-240)	1	Fisherman	46
								Boatman	8
								Sweeper	6

Scientific	Teaching	Administrative	Other Technical	Other non-technical Class IV
		As on 1-4-1965—*contd.*		
		Library clerk · 1	Mechanic (130-200) 1	Mali · · · 5
		Care Taker (Sr.) · 1	Engine Driver · 2	Laskar · · 1
		Care Taker (Jr.) · 1	Carpenter · · 1	
			Serang · · 4	
			Dock Hand. · 5	
			Driver · · 10	
			Launch Driver · 4	
TOTAL · · 169	4	64	86	201

As on 1-4-1966

Director · · 1	Chief Training Supdt. · · 1	Administrative Officer · · 1	Sr. Artist Photographer · · 1	Lab. Boy · · 24
Dy. Director · · 1	Fisheries Training Supdt. · · 1	Accounts Officer · 1	Artist Photographer 1	Fieldman · · 46
Sr. Research Officer 7	Asstt. Fish. Training Supdt. · · 2	Superintendent · 2	Computor · · 1	Gestetner Operator 1
Research Officer (Jr.) 16		Store Keeper (Sr.) 1	Librarian · · 1	Book Binder · 1
Asstt. Research Officer 23		Head Clerk · 1	Scientific Assistant 1	Khanshama · 1
Research Asstt. (Sel. Grade) · · 14		Accountant · 1	Ref. Collection Assistant · · 1	Aquarium attendent · · 1
Survey Asstt. (Sel. Grade). 6		Senior Clerk · 8	Survey Asstt. (Jr.) 27	Boat Driver · 1
Research Asstt. · 69		Sr. Accounts Clerk 1	Lab. & Field Asstt. 22	Daftry · · 1
Survey Asstt. · 22		Sr. store-keeper clerk · · 2	Artist · · 1	Deck Tindel · 2
		Stenographer · 4	Bosun · · 1	Deck Sukhany · 2
		Cashier. · · 1	Asstt. Engine Driver · · 1	Peon · · · 35
		Store-keeper (Jr.) · 2		Watchman · · 20
		Junior clerk. · 35		Fisherman · · 46
				Boatman · · 8

				Store clerk	1	Mechanic	1	Launch Driver.	4		
				Library clerk	1	Engine Driver	2	Sweeper	6		
				Care Taker (Sr.)	1	Carpenter	2	Mali	5		
				Care Taker (Jr.)	1	Serang	1	Laskar.	1		
						Deck Hand	5				
						Driver	10				
TOTAL	169		4		64		85		201		

As on 1-4-1967

Director	1	Chief Training Supdt.	1	Administrative Officer	1	Sr. Artist Photographer	1	Lab. Boy	24		
Dy. Director	1	Fisheries Training Supdt.	1	Accounts Officer	1	Artist Photographer	1	Fieldman	46		
Sr. Research Officer	7	Asstt. Fisheries Training Supdt.	2	Superintendent	2	Computor.	1	Gestetner Operator.	1		
Froge Research Development Officer	1			Storekeeper (Sr.)	1	Librarian	1	Book Binder	1		
Research Officer (Jr.)	16			Head Clerk	1	Scientific Asstt.	1	Khanshama	1		
Asstt. Research officer	23			Accountant	1	Ref. Collection Assistant	1	Aquarium Attendent	1		
Research Asstt. (Sel. Grade)	14			Sr. Clerk	8	Survey Asstt. (Jr.)	27	Boat Driver	1		
Survey Asstt. (Sel. Grade).	6			Sr. Accounts Clerk	1	Lab. & Field Asstt.	22	Daftry	1		
Research Asstt.	69			Sr. Store-keeper Clerk.	2	Artist	1	Deck Tindel	2		
Survey Asstt.	32			Stenographer	4	Bosun	1	Deck Sukhany	2		
				Cashier	1	Asstt. Engine Driver	1	Peon	35		
				Store-keeper (Jr.)	2	Mechanic	1	Watchman	20		
				Junior Clerk	35	Engine Driver	2	Fisherman	46		
				Store Clerk	1	Carpenter	1	Boatman	8		
				Library Clerk	1	Serang	4	Sweeper	6		
				Care Taker (Sr.)	1	Deck Hand	5	Mali	5		
				Care Taker (Jr.)	1	Driver	11	Laskar	1		
						Launch Driver	4				
TOTAL	170		4		64		86		201		

APPENDIX IV

(*Vide* para 2·11)

Statement showing the designation, Scale of Pay, reasons for not filling up the posts.

S. No.	Designation of the Post.	Scale of Pay	No. of posts	Date from which Vacant	Reasons for not filling up the post
1	2	3	4	5	6
1.	Deputy Director.	Rs. 1100-50-1400	1	20-1-64	Due to revision of the recruitment rules the vacancy could not be filled.
2.	Senior Research Officer.	Rs. 700-50-1250	2	17-12-64 6-7-66(AN)	These vacancies fall under promotion quota and proposals for filling these posts by promotion have been finalised.
3.	Research Officer (Junior)	Rs. 400-40-800-50-950.	1	31-8-66	Do.
4.	Fisheries Farm Engineer.	Do.	1	31-7-67	These are newly sanctioned posts and recruitment rules have not yet been finalised.
5.	Fisheries Economist	Do.	1	31-7-67	
6.	Chief Training Superintendent.	Do.	1	5-12-66	Proposals for filling this post by direct recruitment are with the Union Public Service Commission. The post has since been advertised.
7.	Assistant Research Officer.	Rs. 350-25-500-30-590-EB-30-	3	18-3-64 6-7-64	These Vacancies fall under promotion quota and the pro-

		800-EB-30 830-35-900.		5-11-64(AN)	posal for filling these vacancies are with the Ministry
8.	Research Assistant (Selection Grade)	Rs. 325-15-475-EB-20-575.	4	24-4-64 14-9-64 1-6-65 31-8-65	These posts are to be filled 100% by promotion and proposals for filling these posts have been finalised.
9.	Survey Assistant (Selection Grade)	Do.	1	3-12-65 (AN)	
10.	Research Assistant (Ordinary Grade)	Rs. 210-10-290-15-320-EB-15-425.	17	10-1-63 14-10-63 9-11-63 30-11-63 (AN) 15-5-64 26-9-64 21-10-64 30-6-64 (AN) 11-6-65 14-6-65 26-6-65 3-11-65(AN) 4-12-65(AN) 11-3-66 31-3-66 25-6-66 (AN) 15-7-67 (AN)	Due to non availability of candidates through the Employment Exchanges and sometimes through advertisements the posts could not be filled. Further due to ban on filling up Vacancies imposed by the Ministry in their letter No. 4-25/65 FY(I)/B&A dated 23rd August, 1966 no recruitment action was taken upto May, 1967. Recruitment action has however since been initiated in respect of many vacant post.

1	2.	3	4	5	6
11.	Survey Assistant	Rs. 210-10-290-15-320-EB-15-425.	8	31-7-65 6-5-66 15-6-66 16-6-66 10-8-66 8-6-67(AN) 11-7-67 18-7-67	Due to non availability of candidates through the Employment Exchangesand sometimes through advertisements, and posts could not be filled. Further due to ban on filling up vacancies imposed by the Ministry in their letter No. 4-25/65-FY(I)/ B&A dated23rd August, 1966 no recruitment action was taken upto May, 1967 Recruitment action has however since been initiated in respect of many vacant posts.
12.	Survey Assistant (Junior)	Rs. 130-5-160-8-200-EB-8-256-EB-8-280-10-300.	7	8-6-65 2-8-65 24-6-66 4-7-67 17-7-67(AN) 24-7-67 4-8-67	
13.	Overseer.	Rs. 210-10-290-15-320-EB-15-425.	1	13-7-67	These are newly sanctioned posts and recruitment rules havenot yet been finalised.
14.	Draftsman	Do.	1	13-7-67	
15.	Estimator.	Do.	1	13-7-67	
16.	Scientific Assistant	Do.	1	22-4-66	Due to non-avaliablility of candidates through the Employment

17.	Head Clerk	Rs. 210-10-290-15-320-EB-15-380.	1	14-1-66	Exchanges and sometimes through advertisement the posts could not be filled. Further due to ban on filling up vcancies imposed by the Ministry in their letter No. 4-25/65 FY-(I)/B & A dated 23rd August, 1966 no recruitment action was taken up to May, 1967. Recruitment action has however since been initiated in respect of many vacant posts.
18.	Junior Clerk.	Rs. 110-3-131-4-155-EB-4-175-5-180.	4	19-4-66 5-5-66 22-12-66 (AN) 1-8-67	
19.	Store Clerk.	Do.	1	31-5-67	
20.	Care Taker (Junior)	Rs. 110-3-131-4-155-EB-4-175-5-180.	1	29-5-62	
21.	Laboratory and Field Assistant	Rs. 110-4-150-EB-4-170-5-180-EB-5-200	9	1-7-65 16-8-65 28-12-65 16-2-66 1-10-66(AN) 15-12-66 (AN) 12-8-66 3-12-66 19-6-67	Due to non-availability of candidates through the Employment Exchanges and sometimes through adverstisements the posts could not be filled. Further due to ban on filling up vacancies imposed by the Ministrx in their letter No. 4-25/65-FY (I)/B & A dated 23rd August, 1966 no recruitment action was
22.	Engine Driver	Rs. 110-3-131-4-139	1	4-9-64	
23.	Serang	Rs. 110-3-131	3	1-7-64 13-10-65 29-5-62	

1	2	3	4	5	6
24.	Launch Driver	Rs. 110-3-131-4-139	4	24-3-62	taken upto May, 1967. Recruitment action has however since been initiated in respect of many vacant posts.
25.	Laboratory Boy.	Rs. 80-1-85-2-95-EB-3-110.	1	22-8-63	
26.	Fieldman	Do.	1	15-5-67	
27.	Peon	Rs. 70-1-80-EB-1-85.	2	16-10-66 16-8-67	
28.	Deck Tindel	Rs. 75-1-85-EB-2-95.	1	16-6-67	
29.	Deck Sukhany	Rs. 70-1-80-EB-1-85.	1	17-1-66	
30.	Fisherman	Rs. 70-1-80-EB-1-85.	11	3-6-64 (4 Nos.) 7-8-65 27-1-66 27-1-66 6-6-66 21-6-66 23-6-66(AN) 24-6-66(AN)	Due to non-availability of candidates through the Employment Exchanges and sometimes through advertisements the posts could not be filled. Further due to ban on filling up vacancies imposed by the Ministry in their letter No. 4-25/65-FY(I)/B & A dated 23rd August, 1966 no recruitment action was taken upto May, 1967. Recruitment action has however since been initiated in respect of many vacant posts.
31.	Boat Driver	Rs. 80-1-85-2-95-EB-3-110	1	24-3-62	
32.	Boatman	Rs. 70-1-80-EB-1-85.	1	24-3-62	
33.	Sweeper	Do.	1	16-6-67	

APPENDIX V

(*Vide* para 2.23)

Statement showing the number of Temporary Staff

Technical	No. of posts	Date from which working in temp. post	When they are likely to be made permanent
1	2	3	4
1. Frog Research & Development Officer.	1	29-8-66	Will be confirmed when the posts is converted into a permanent one.
2. Research Officer (Junior).	3	9-4-62 4-12-62 6-2-63	The case of confirmation has been pending with the Ministry of Food, Agriculture, Community Development & Cooperation, New Delhi. These proposals will be referred to D.P.C. shortly.
3. Assistant Research Officer.	4	7-4-64 1-6-65 10-1-64 2-11-65	Do.
4. Senior Artist Photographer.	1	2-3-64	The post has been converted into a permanent one recently and the incumbent will be confirmed shortly.
5. Artist . . .	1	16-12-65	Will be confirmed after completion of probation period.
6. Research Assistant .	11	From 1-11-61 onwards till 9-10-67	When the posts are converted into permanent ones. Will be confirmed after completion of probation period and when the posts are converted into permanent ones.

1	2	3	4
7. Survey Assistant ·	8	From 11-7-61 onward till 4-10-67	When the posts are converted into permanent ones. Will be confirmed after completion of probation peroid and when the posts are converted into permanent ones.
8. Junior Survey Assistant.	2 3	From 5-3-63 onwards till 25-7-67	When the posts are converted into permanent ones. Will be confirmed after completion of probation period and when the posts are converted into permanent ones.
9. Assistant Fisheries Training Superintendant.	1	15-6-62	Likely to be made permanent shortly.
10. Reference Collection Assistant.	1	16-6-65	Will be confirmed after completion of probation period.
11. Computor · ·	1	15-7-66	Do.
12. Librarian · ·	1	10-11-65	Do.
13. Mechanci · ·	1	22-3-67	Do.
14. Laboratory & Field Assitsant.	9	From 18-11-65 onwards till 6-10-67	Will be confirmed after completion of probation period.
15. Deck Hand · ·	1	1-9-64	Will be confirmed when the post is onverted into a permanent one.
16. Serang · · ·	1	14-2-67	Will be confirmed after completion of probation period.
17. Driver · · ·	4	From 6-8-63 onwards till 1-3-67	When the posts are converted into permanent ones.

APPENDIX VI

(*Vide* para. 3.7)

***Extract from the Report of the Fisheries Research Committee* (1954)**

Dr. B. N. Chopra	*Chairman.*
Dr. Wills H. Rich	*Member.*
Dr. N. K. Panikkar	*Member.*
Dr. H. Srinivasa Rao	*Co-opted Member.*

GOVERNMENT OF INDIA

MINISTRY OF FOOD AND AGRICULTURE

VIII. Programme of future work of the Central Fisheries Research Stations

At the request of the Ministry of Food & Agriculture, we have already expressed our views on the research schemes to be included in the programmes of the Central Research Stations in the Second Five Year Plan. (Committee's Report dated the 3rd July, 1954, forwarded with the Chairman's D.O. letter No. 79/F.D.A./Camp Ernaculam, dated the 5th July, 1954, to Shri M. R. Bhide, Joint Secretary, Ministry of Food and Agriculture). For convenience of reference and making the present report self-contained, a brief outline of the future programme of work of the Stations, as recommended by us, is given here.

1. *Central Inland Fisheries Research Station*

2. In our review and assessment of the work, we have made recommendations about modifications in some items of work under investigation at present. Subject to these recommendations, the existing programme should be continued. In addition, the following new projects are recommended for implementation:—

1. ESTUARINE SECTION

3. *Establishment of a Brackish-water Fish Farm at Diamond Harbour.*—The areas around the estuaries of Matlah are suitable for brackish-water fish culture and some private fish farms are now in operation in these areas. For working out improved methods and

helping to stabilise the fish farm industry and increasing production, it is necessary to establish a brackish-water farm in this area, where experimental work may be carried on along proper scientific lines. Work in this farm should be chiefly on mullets and prawns and experiments should be designed and results analysed with the help of a competent statistician. The economics of operations under different conditions that exist in the area, should receive special attention. We also recommend that a member of the research staff should be sent for training in brackish-water fish culture to Indonesia and Australia at as early a date as possible.

4. *Studies of the Hilsa and other fisheries of the Hooghly, Matlah and Mahanadi estuaries.*—We recommend that studies on estuarine capture fisheries should be especially directed to the major fisheries and that Hilsa work should be substantially strengthened and intensified. Investigations should include careful study of fluctuations of annual abundance of Hilsa, mullets and other important fishes and prawns and crabs. On account of difficulty of access and lack of transport in the fishing areas of the estuaries, we recommend that for the successful prosecution of this programme, a small shallow-draft boat be provided for the use of the Station. This vessel should be designed by an expert Marine Engineer acquainted with the conditions prevailing in the estuaries.

2. Riverine and Lacustrine Section

5. *Establishment of Lacustrine Unit.*—Large numbers of lakes and reservoirs exist in the country, but most of them are not utilized for fish production. With the object of determining existing conditions in these waters and developing methods for utilizing them for fish production we recommend the establishment of a Mobile Unit so that the lakes and reservoirs in various States, more especially in Northern and Central India, could be surveyed and studied.

6. *Water Pollution Investigations.*—Pollution of water by industrial and other effluents has a very important bearing on public health, irrigation, agriculture and fisheries and problems connected with it have to be studied on a very broad basis. This can best be done by a separately constituted Central Water Pollution Board, the setting up of which is strongly recommended. Fisheries interests should be adequately represented on this Board.

Fisheries work on this project should be restricted to the collection of accurate and adequate information on pollution as it affects fisheries. If the proposed Pollution Board is not set up in the

immediate future, a separate project should be prepared for pilot studies in one or two small areas with selected types of pollution with reference to fisheries.

7. Riverine Units for the Narmada-Tapti and Godavari Krishna Systems.—We recommend the establishment of small research units to survey the fish and fisheries of the Narmada-Tapti and Godavari-Krishna systems and the available supplies of fish-seed for stocking purposes.

8. Fishery survey of the Ganga System—Information on the fisheries of the Ganga system and statistics of fish landings to determine the status of the different fisheries are completely lacking. A sound programme of research on river fisheries can be based only on these data. We recommend that early steps be taken to work out a system of collection of fisheries statistics. The work may be started on pilot scale at one or two selected centres and, when the methods have been developed, the fisheries survey may be extended to the major centres of production. This work should be planned in consultation with the Statistical Division of the Indian Council of Agricultural Research and the Survey Section of the Central Marine Fisheries Research Station.

9. The Committee attach much importance to this work and considers that it would be desirable to initiate the programme, if possible, even before the end of the First Five-Year Plan so that preliminary work will have been completed and staff recruited and trained before the commencement of the Second Five-Year Plan.

3. Pond Culture Section

10. Experimental Fish Farm—For studying fish culture in swampy and marshy areas and to develop efficient methods of pond managements under such conditions, there is need for an experimental fish farm in West Bengal, Assam or Bihar. We recommend the establishment of such a farm in one of the above States in which the State Government may be willing to cooperate by providing necessary facilities in the way of land and buildings.

11. We also recommend the examination of the possibility of starting in the Andhra State a Pond Culture Sub-Station, like that at Cuttack. It is suggested that the Andhra Government be approached to give the necessary facilities.

12. Fish cultivation in paddy fields—We recommend that a series of well-designed experiments be carried out on the culture of fish

in paddy fields in one or two selected areas. The work is extremely important and, although similar work is planned in Mysore and Madras, it would be desirable to have the work duplicated in a number of centres.

4. General Section

13. In our review of the present programmes, we have referred to lines of work are common to all the sections which for convenience, have been grouped under a General Section. This Section requires strengthening and expansion in order that the existing programmes and those contemplated under the Second Five-Year Plan could be developed on sound lines. Almost all the major lines of work proposed under the Second Five-Year Plan require continuing and constant statistical advice of a high calibre. The existing statistical staff is utterly inadequate for this purpose.

14. In view of the continuing and increasing demand from the States for personnel trained in the management and development of fisheries, fisheries training work should be stabilised and put on a permanent footing.

XI. Summary, conclusions and recommendations

Central Inland Fisheries Research Station

74. Investigations on the hydrology and plankton of the Mahanadi and Hooghly-Matlah estuaries have not been sufficiently critical, extensive or correlated with the fluctuations in fisheries. It is recommended that these investigations be discontinued for the present. Chapter VII, Para. 3).

75. Present studies on mullets, when completed, will provide information of value to the management of mullet farms. These studies should be expanded (Chapter VII, Para. 3).

76. It would be desirable to expand work on prawns and crabs and pay special attention to their fisheries, rather than to their biology alone. (Chapter VII, Para. 3).

77. Investigations carried out in the Estuarine Section have been of a diffuse nature and have not provided information adequate for an understanding of the different fisheries exploited in the estuaries. (Chapter VII. Para. 3).

78. Work of the Estuarine Section should be concentrated on major fisheries, such as those of the Hilsa. (Chapter VII, Para. 4).

79. Field Stations should be set up at convenient major fishing centres. (Chapter VII, Para. 4).

80. More attention should be paid by the Riverine Section to the fisheries and fishery biology of major carps, cat fishes and other species of known commercial value. (Chapter VII, Para. 6).

81. The study of the fishery of juvenile carps at Buxar is a desirable line of investigation, but should be correlated with detailed information on fishery for adults. (Chapter VII, Para. 6).

82. Work on pollution should be restricted. (Chapter VII Para. 6).

83. Surveys for discovering new sources of carp fry are of great practical value and should be intensified. (Chapter VII, Para 6).

84. Hydro-biological studies of the river Ganga at Buxar and Allahabad have so far been of scientific interest without an obviously direct bearing on fisheries research. (Chapter VII, Para. 6).

85. The basic data for research on riverine fisheries are not yet available and steps should be taken to evolve a system of fisheries survey of the rivers. (Chapter VII, Para. 7).

86. Work on the minor fisheries and hydro-biological studies should be curtailed. (Chapter VII, Para. 7).

87. Very valuable information has been collected and techniques developed by the Pond Culture Section for the collection and rearing of carp fry. (Chapter VII, Para. 9).

88. Very satisfactory progress have been made in collecting valuable information and developing improved techniques for fish culture. (Chapter VII, Para. 9).

89. The study of factors responsible for spawning of carps in bundh-type of tanks is a very promising line, to which greater attention should be given. (Chapter VII, Para. 9).

90. Work on predatory fishes may be discontinued for the present. (Chapter VII, Para. 9).

91. Work on the life-history of fresh-water fishes should be restricted to a study of the younger stages only. (Chapter VII, Para. 9).

92. Studies on the culture of fish in paddy fields are of great practical importance and experiments should be properly designed.

and results analysed with the help of competent statisticians. (Chapter VII, Para. 9).

93. The work of the Pond Culture Section is of good quality and well directed towards the ultimate goal of increased production. (Chapter VII, Para. 10).

94. The training work should be considerably strengthened and placed on a permanent footing. (Chapter VII, Para. 14).

95. The statistical work of the Inland Stations is weak and requires strengthening. (Chapter VII, Para. 14).

96. The progress of work of the Central Inland Fisheries Research Station, taken as a whole, has not come up to expectations. The Pond Culture Section is doing good work of considered practical value, but the work of the Estuarine and Riverine Sections has not been of the same quality and practical value. (Chapter VII, Para. 15).

APPENDIX VII

(*Vide* para 3.41)

*List of Important Major Carp Induced Breeding Centres in India.**

Sl. No.	Name of the State	Name of the District	Name of the Centre
1	2	3	4
1	ANDHRA PRADESH	Cuddapah	Cuddapah fish farm.
		East Godavari	Katheru fish farm Kodiam fish farm.
		Hyderabad	Hussainsagar fish farm.
		Karimnagar	Kumarvarikunta fish farm, Manair reservoir, Vadla Ramayya kunta.
		Khammam	Wyra fish farm.
		Kurnool	Sunskesula fish farm.
		Vijayawada	Moturu fish farm.
		Vizagapatnam	Dykes tank Gambhiragadda reservoir.
		Warangal	Mondi kunta, pedda tank.
		West Godavari	Bodampuri, fish farm
2	ASSAM	Darrang	Hazarpukri (Tezpur)
		Goalpara	Goalpara
		Kamrup	Gauhati
		Lakhimpur	Naharpukhri (Dibrugarh)
		Nowgong	Raha.
		Sibsagar	Barbheta, Joysagar.
3	BIHAR	Muzaffarpur	Muzaffarpur
		Patna	Patna

*The list is limited to information furnished by different states and is not necessarily complete.

1	2	3	4
4	GUJARAT	Baroda	Ajva, Dabhoi
		Panch Mahal	Godhra
		Sabrkantha	Prantij
		Surat	Kakrapar
			Karad.
5	KERALA	Palghat	Malampuzha
6	MADHYA PRADESH	Bilaspur	Khutaglhat
		Bhopal	Bhopal
		Chhatarpur	Nowgong
		Katni	Tiksrwara
		Raigarh	Padegaon
		Raipur	Raipur
		Raisen	Goharganj
		Dirg	Nanja
7	MADRAS	Chingleput	Poondi
		Coimbatore	Bhavanisagar
		North Arcot	Sathanur
		Salem	Krishnagiri
		Tirunelveli	Manimuthar
		..	Amaravati
		..	Lalpet
		..	Mettur Dam
		..	Thanjavur
		..	Vaigal
8	MAHARASHTRA	Bhandara	Kham tank, Seheo-
		Bombay	ne bundh fish
			Bhiwandi tank, Chembur farm tank, Powai lake.
		Chandrapur	Kinhi tank.
		Kolaba	farm.
		Kolhapur	Kolhapur (Residenc tank).
		Marathwada region	
		Nagpur	Three tanks.
			Kelzhar tank, Telenkheri tank.
			Katol tank.
			Khindsi lake.
			Ramtek.
9	MYSORE		Bannur
			Neerasagar fish farm
			Vanirilassagar fish farm.

1	2	3	4
10	ORISSA	Bolangir	Bolangir
		Cuttack	Bhavanipatna, Cuttack
		Ganjam	Berhampur
		Koraput	Jeypore
		Mayurbhanj	Kathpal
		Sambalpur	Sambalpur
		Puri	Kaushalyaganga
11	PUNJAB	Ambala	Chandigarh
		Gurdaspur	Gurdaspur
		Gurgaon	Faridabad
		Hissar	Ottu, Sirsa
		Hoshiarpur	Neela
		Kapurthala	Kapurthala
		Karnal	Karnal
		Patiala	Patiala, Nabha
		Sangrur	Sangrur
		Simla	Nalagarh
12	TUNGABHADRA BOARD		Tungabhadra Dam.
13	UTTAR PRADESH	Agra	Atrauni fish farm
		Faizabad	Faizabad
		Gonda	Gonda
		Jaunpur	Gujartak fish farm.
		Jhansi	Matatilafishfarm
		Lucknow	Lucknow
		Meerut	Meerut
		Mirzapur	Mirzapur
		Pilibhit	Shardasagarfish farm
		Shahjahanpur	Shahjahanpur
		Varanasi	Varanasi
14	WEST BENGAL	Nadia	Kalyani

APPENDIX VIII

(*Vide* para. 4.32)

(*Note on the extension activities of the State Governments*

1. **Andaman & Nicobar Islands**—No research institutes have been set up.

2. **Assam.**—The State has established only one Research Centre at Joysagar in Sibsagar District, where results are yet to be achieved.

3. **Goa.**—The results are made known through the agency of District Extension Officers.

4. **Himachal Pradesh.**—No research institutions have been set up.

5. **Jammu & Kashmir.**—The results of research achieved by Research workers are made available to the users through Departmental agencies.

6. **Laccadives, Minicoy & Amindiv:** No research institutes have been set up.

7. **Madhya Pradesh:** A programme of applied research has been taken at Fish Research Laboratories at Nowgong, Gwalior, Raipur and Bhopal. The results achieved there are given a field trial in the fish-farms, village-ponds and tanks selected for the purpose. The results are carried to the private parties through Fisheries Extension Officers.

8. **Madras.**—The results achieved by various Research Units are known by the Department to the users through audio-visual publicity vans, (fish projectors, tape records and loud speakers), by participation in Agricultural Seminars exhibitions and fairs where specimens, charts, models relating to research are exhibited. A journal is published in English and booklets and handouts in Tamil are also distributed. Separate seminars on fisheries are arranged in the Districts. Actual demonstrations of seed collection, seed production by indused spawning, seed transport, feeding and rearing procedures in departmental nurseries and fish farms are arranged. Other methods employed for propagation of results are:—

(1) Periodical radio talks.

(2) Documentary films.

(3) Demonstration of actual fishing operations over new fishing grounds located by the Department.

9. **Manipur.**—No research institutions have been set up.

10. **Nagaland.**—No research institutions have been set up.

11. **Punjab.**—No research institutions have been set up.

12. **Rajasthan.**—A Research Laboratory is located at Udaipur. The results achieved are circulated to the Regional Fisheries Development Officers from where these are propogated to private pisciculturists, fish contractors etc.

13. **Tripura.**—No research institutes have been set up.

14. **Uttar Pradesh.**—No Fisheries Research Institute has been set up by the State Government. Investigations regarding various field problems are carried out at the Central Fisheries Laboratory at Lucknow. The results thus derived after field trials are recommended for applications or guide letters. Results of general interest are compiled and printed either as handbills or small booklets for distribution. Demonstration tanks have been established in the Disbution. Demonstration tanks have been established in the Districts. Stalls are also set up in important fairs and exhibitions, Lectures and films shows are also arranged.

15. **West Bengal.**—The results achieved in the two State-owned Institutions are made known to fishermen and fish farmers through,

(1) Publication of popular literature in the form of booklets and pamphlets; and

(2) Demonstrations by trained Extenston staff posted in different Districts, Sub-Divisions and Blocks.

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APPENDIX IX
(*Vide* para 5·14)

Statement showing the number of persons trained Inland Fisheries Training Course.

Name of State	48-49	49-50	50-51	51-52	52-53	53-54	54-55	55-56	56-57	57-58	58-59	59-60	Total
Assam	2	3	..	1	1	1	2	2	4	3	2	3	24
Ajmer	..	..	..	..	1	..	..	..	..	..	..	..	1
Bihar	3	..	1	1	2	2	1	1	4	2	1	..	18
Baroda	1	..	..	..	..	..	..	..	..	..	..	..	1
Bombay	..	..	..	1	..	..	..	2	3	..	2	4	12
Delhi	..	..	..	1	..	1	..	..	1	..	..	1	4
Hyderabad	..	2	4	1	1	..	1	1	1	..	..	..	11
Andhra Pradesh	..	..	..	..	..	..	..	..	1	..	..	3	4
Madhya Bharat	..	..	..	..	1	1	2	..	2	..	..	..	6
Madhya Pradesh	..	..	..	..	2	..	2	1	1	2	4	3	15
Bhopal	1	..	..	..	1	1	..	..	..	..	..	..	3
Vindhya Pradesh	..	..	..	..	..	2	2	2	1	..	..	..	7
Orissa	..	..	..	..	..	..	..	..		34	4	..	11
Punjab	1	1	..	..	1	1	1	..	1	1	1	1	9
Pepsu	..	2	..	..	..	..	..	..	..	..	..	..	2
Mysore	..	1	..	2	..	..	..	..	..	1	3	1	8
Kerala	..	1		..	..	..	..	..	..	1	..	3	5
Tripura	..	..	1	..	..	..	1	..	..	1	2	..	5

Uttar Pradesh	..	..	..	..	1	..	..	..	..	1	2	3	2	2	5	3	6	25
West Bengal	..	..	..	..	..	..	..	1	..	..	..	4	8	6	12	10	3	44
Jammu & Kashmir	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Himachal Pradesh	..	..	..	..	..	..	..	..	..	..	..	1	1	1	..	..	..	3
N.E.F.A.	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	2
Manipur	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2	4
Rajasthan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Madras	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gujarat	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pondicherry	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nagaland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL					9	10	6	8	11	11	21	20	32	30	35	33	226	

Foreign Candidates.

Nepal	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1
Thailand	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
Malaya	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
Burma	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Uganda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Philippines	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Viet Nam	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hong Kong	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	6	1	8
GRAND TOTAL	..	..	..		9	10	7	8	11	11	21	20	32	30	41	34	234	

Appendix IX—*contd.*

Name of State	60-61	61-62	62-63	63-64	64-65	65-66	66-67	Total	Current Session 1967-68
Assam	1	1	2	3	1	4	3	15	..
Bihar	1	6	..	..	..	7	4	18	3
Andhra Pradesh	3	..	1	..	1	1	..	6	..
Madhya Pradesh	3	3	2	3	3	3	2	19	3
Orissa	2	..	..	..	3	2	3	10	2
Punjab	1	5	3	3	3	3	8	26	4
Mysore	..	4	4	1	1	2	1	13	..
Kerala	1	..	..	3	..	1	..	5	..
Tripura	1	5	1	3	..	1	5	16	3
Uttar Pradesh	5	2	5	4	4	4	4	28	4
West Bengal	1	2	..	1	1	3	1	9	2
Kasmir & Jammu	..	1	..	..	..	..	..	1	..
Himachal Pradesh	1	..	1	..	..	1	2	5	1
N.E.F.A.	..	2	1	1	1	..	1	6	1
Manipur	..	1	..	..	..	..	..	1	..
Rajasthan	..	..	..	2	..	2	..	4	..
Madras	1	2	3	1	3	2	..	12	..
Gujarat	..	2	2	..	1	2	1	8	1
Pondichenry	..	..	1	..	1	..	..	2	..
Nagaland	..	..	..	1	1	1	3	6	2

Maharashtra	3	..	..	..	..	1	..	4	..
Harayana	..	..	..	..	..	..	1	1	2
Delhi Administration	..	..	..	..	1	1	..	2	..
TOTAL	24	36	26	26	25	41	39	217	28
Foreign Candidates.									
Nepal	1	..	1	..	..	..	..	2	2
Thialand	..	1	..	..	..	..	..	1	..
Malaysia	2	..	..	..	..	1	1	4	2
Philippines	1	..	1	..	..	2	..	4	..
Viet Nam	..	1	..	..	..	..	..	1	..
Hong Kong	..	..	1	..	..	..	..	1	..
Nigeria	..	..	..	..	..	..	3	3	..
TOTAL	4	1	3	..	..	3	4	16	4
GRAND TOTAL	28	38	29	26	25	44	43	233	32

Number of candidates trained upto 1959-60	234
Number of candidates trained from 1960-61 to 1966-67	233
TOTAL	467
Number of candidates under training in 1967-68 session	32
GRAND TOTAL	499

APPENDIX X

(*Vide* para 6.1)

Statement showing the Financial Performance against the Plan Provisions

	Budget Provision			Expenditure		
	Revenue	Capital	Total	Revenue	Capital	Total
Ist Five Year Plan						
1951-52	..	..	..	..	..	..
1952-53	45,000	95,000	1,40,000	4,397	..	4,397
1953-54	80,000	87,000	1,67,000	37,151	4,367	41,518
1954-55	1,61,000	12,00,000	13,61,000	79,300	54,095	1,33,395
1955-56	1,90,900	18,45,000	20,35,900	1,28,574	..	1,28,574
	4,76,900	32,27,000	37,03,900	2,49,422	58,462	3,07,884
IInd Five Year Plan						
1956-57	3,34,300	8,00,000	11,34,300	3,13,790	..	3,13,790
1957-58	4,00,000	2,00,000	6,00,000	3,80,844	..	3,80,844
1958-59	4,25,600	75,000	5,00,600	4,37,500	..	4,37,500
1959-60	5,65,000	..	5,65,000	5,46,132	..	5,46,132
1960-61	7,00,000	2,00,000	9,00,000	6,42,605	37,170	6,79,775
	24,24,900	12,75,000	36,99,900	23,20,871	37,170	23,58,041

IIIrd Five Year Plan						
1961-62	1,91,200	4,95,000	6,86,200	52,215	..	52,215
1962-63	2,37,000	3,13,000	5,50,000	2,22,822	1,47,042	3,69,864
1963-64	3,45,000	1,89,000	5,34,000	3,55,426	82,810	4,38,036
1964-65	3,82,000	1,40,000	5,22,000	5,04,311	79,229	5,83,540
1965-66	4,90,000	4,23,000	9,13,000	5,31,357	1,51,742	6,83,099
	16,45,200	15,60,000	32,05,200	16,66,131	4,60,823	21,26,754
IVth Five Year Plan						
1966-67	1,35,000	4,50,000	5,85,000			
1967-68	1,35,000	13,25,000	14,60,000			
	2,70,000	17,75,000	20,45,000			

APPENDIX XI

Summary of Conclusions/Recommendations contained in the Report

Sl. No.	Reference to Para number of the Report	Summary of conclusions/Recommendations
1	2	3
1	1·10	The Committee note the objectives of the Institute and the efforts made so far to realise the same. They are glad that significant advances have been made in the research on pisci-culture and fish production. Being the premier research institution in the country devoted to inland fisheries, the Institute has a great responsibility in evolving new methods and techniques for fish culture and suggesting means for increasing fish production in available inland waters. Alongside the researches on fish cultural techniques investigations on the biology of important fisheries, etc. there is an imperative need for disseminating the results of researches to the fish farmers who want to take up fisheries as a profession. The Committee hope that the Institute would keep this objective in view while carrying on research work.
2	1.29	The Committee note that although the administrative control of the Central Inland Fisheries Research Institute has been transferred to the I.C.A.R. with effect from 1st October, 1967, exploratory fishing in Sundarbans estuaries, brackish water fishing farm in lower Sundarbans and Inland Fisheries Training Section, which were hitherto dealt with in the Institute, have not been transferred to the I.C.A.R. In view of the fact that brackish water fish culture can become a very major industry if properly developed, the importance of the exploratory fishing and brackish water fish farming started in the Sundarbans areas can hardly be overemphasised. The Committee would, therefore,

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		like to be assured that the work already done in exploratory fishing in Sundarbans estuaries and in setting up the brackish water fish farm in Kakdwip would continue to be dealt with by some Central agency so that they receive the attention they deserve.
3	2·9	The Committee are glad to note that the Director of the Institute conducts an annual review of the staff strength of the Institute. The Committee would, however, like to suggest that besides an annual review by the Director, there should be a separate review every year of the staffing pattern of the Institute by the Standing Research Committee of the Ministry or the appropriate committee of the Indian Council of Agricultural Research. That Committee should not only examine to what extent the available resources of the Institute have been utilised to carry out the projects already entrusted to it, but also assess the need for additional posts in the Institute in the context of new research programmes proposed to be undertaken by it. The Committee while reviewing the research programmes should also locate the deficiencies in the various Divisions and Sections of the Institute and suggest suitable remedial measures.
4	2·18	The Committee are surprised to note that against 531 sanctioned posts as many as 106 posts of all categories, *i.e.* 20 per cent were vacant on 7th September, 1967. The Committee regret that despite the observations of the two reviewing teams—the Chopra Committee (1954) and Professor Swingle (1961)—that considerable delays took place in filling up vacant posts, Government did not consider it necessary to tackle the problem effectively and take suitable remedial measures. While the Committee are inclined to accept the Ministry's contention that staff has done useful work, they have no hesitation in saying that their output would have been larger in physical terms had all the vacant posts been filled up. While the reasons for the large number of posts remaining vacant might be diverse, their effect on the efficiency of the Institute must be cumulative. The Committee apprehend that un-

1	2	3
		less quick and energetic steps are taken to fill up the vacant posts, the execution of the projects taken up by the Institute would be seriously hampered. The Committee appreciate the difficulties of the Ministry in filling up some scientific posts with suitable personnel on account of unattractive pay-scales attached to them. They, however, feel that this is a matter which should have been known to the Ministry when they planned their programmes of work requiring the services of competent technical personnel. Steps should have been taken to obtain necessary financial sanction to revise the pay scales in appropriate cases so as to attract persons with requisite qualifications.
	2.19	Now that the Central Inland Fisheries Research Institute has come under the control of the Indian Council of Agricultural Research, the Committee hope that that organisation would take note of the present position and adopt suitable remedial measures in this direction.
5	2.20	The Committee are unhappy to note that suitable departmental candidates were sometimes not forthcoming to fill up promotional quotas and as such there was delay in filling up some of the posts. In the opinion of the Committee, this only shows a lacuna in the training arrangements in the Institute. The Institute should so plan their work and train up their personnel that at each level there is a second rung of the qualified scientists who should be in a position to come up and man the senior scientific posts as and when they fall vacant.
6	2.21	The Committee are unhappy about the inordinate delay in filling up the post of Deputy Director which has remained vacant since January, 1964. They fail to see why requisite qualifications for this post were not laid down when a requisition was sent to the Union Public Service Commission in 1964. The Committee would urge that, before a new post is actually sanctioned, care should be taken to spell out in detail the qualifications and the experiences which a candidate for the same is expected to possess. While sending requisitions to the Union Public Service Commission for filling up the vacant posts, full particulars about the qualifications and research experience etc. required of the candidates should

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		be sent simultaneously. It should also be ensured that no post remains vacant for more than six months and, if necessary, arrangements should be made to fill up the vacant posts on an *ad hoc* basis, so that research work is not handicapped.
7	2.22	The Committee would suggest that the Ministry may examine the causes of delay in filling up such vacant posts of Classes III and IV staff as Care-taker, Engine Driver, Launch Driver, Laboratory Boy, Fisherman, Boat Driver. Boatman, Sweeper, etc. which are normally filled through Employment Exchange. In case such candidates are not forthcoming from the Employment Exchanges, no time should be lost in recruit the same from the open market.
8	2.25 2.26	The Committee are not happy about the continuance of a large number of temporary posts some of which were created as early as 1961. Apart from the deleterious effect the temporary nature of a post has on the pensionary rights of a worker, the quality of research is adversely affected in-asmuch as a temporary employee would be more preoccupied with the search for a secure job to the detriment of research. The Committee have already dealt with this problem in para 99 of their Seventy-fifth Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Council of Agricultural Research. They hope that the Council would consider the cases of temporary posts in the Central Inland Fisheries Research Institute in the light of the recommendation made in their Seventy-fifth Report.
9	2.28	The Committee note that among the category of other technical posts are included such persons as photographer, artist, computer, librarian, scientific assistant, driver, mechanic, carpenter etc. It is obvious that these functionaries do not undertake research or teaching work. Taking the teaching staff in the category of scientific personnel, the percentage of scientific staff in the Institute comes to 33. As against this, the percentage of non-scientific staff is 67. The Committee feel that there is an imbalance in the staffing pattern of the Institute inasmuch as

1	2	3
		there is a preponderance of administrative staff as compared to scientific staff. It is desirable to lay down a correct ratio between the administrative staff and the research staff not only in this Institute but in all Central Research Institutes dealing with fisheries.
10	2.30	The Committee would suggest that the Central Inland Fisheries Research Institute and the Indian Council of Agricultural Research, to which the Institute is now transferred, should carefully consider the general principles laid down by the Scientific Advisory Committee of the Cabinet while deciding the administrative pattern of the Institute. It should be ensured that the Institute is staffed with proper scientific personnel, there is clear delegation of powers and that scientists are provided with proper administrative personnel to relieve them of routine administrative work.
11	2.30	The Committee would suggest that the question of setting up of a Governing Council for this Institute on the lines of the general principles laid down by the Scientific Advisory Committee of the Cabinet should be considered and the Estimates Committee informed in due course about the action taken in the matter.
12	2.33	The fact that the chances of promotion to higher posts or higher scales for scientific personnel are less in Research Institutes has already been highlighted by the Committee in their 75th Report (Third Lok Sabha) on the Ministry of Food and Agriculture (Department of Agriculture)—Indian Council of Agricultural Research. The Committee would reiterate the recommendations made in para 91 of their Report and suggest that the matter may be pursued vigorously.
13	2.37	The Committee feel that the presence of two or more officers of identical rank at the same sub-station and one of them being designated as the Officer-in-Charge-cum-Senior Research Officer is likely to lead to administrative difficulties. They, therefore, recommend that the designation of the Senior Research Officer, who also looks after the administration of a Sub-Station, should be suitably changed.

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14	2·37	The Committee feel that the Head of the Sub-Station, who has to undertake research work, should not be burdened with administrative duties. They suggest that the question of providing suitable administrative assistance to the Head of each of the Sub-Stations may be considered.
15	2·40	The Committee would recommend the extension of the scheme of merit promotions and advance increments to the Central Institutes on the Fisheries side, if not already done, so that such of the members of the staff as have done outstanding work are suitably rewarded.
16	3·12	The Committee commend the steps taken by the Standing Fisheries Research Committee for coordination of fisheries research in the country. They suggest that the proceedings of the Standing Fisheries Research Committee should be publicised and made available to al fisheries research institutes in the Centre and in the States as well as to universities which impart teaching in fisheries and allied sciences.
17	3·12	The Committee suggest that the Standing Fisheries Research Committee should hold their sittings at important fishing centres of the country so as to bring the representatives of the industry into closer contact with research workers.
18	3·12	The Committee feel that for better coordination the regional committees should meet frequently and discuss problems of common interest and a report of discussions held at such meetings should be made available to the Standing Fisheries Research Committee.
19	3·1	The Committee cannot overemphasise the importance of taking up research projects which are likely to have a definite impact on fish production. They are glad to note that one of the criteria for selecting new projects is the benefit that would accrue in terms of increased production. They would, however, stress that before a project is taken up for implementation, the economics thereof should be fully gone into and worked out in detail.

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20	3·21	The Committee are unhappy to note that the Institute has no mechanism to assess the impact of its researches on fishery development either in West Bengal or in other States. They suggest that a method may be devised in consultation with the State Governments whereby it should be possible for the Institute to adjudge to what extent increased yield has been effected as a result of the techniques evolved by it.
21	3·26	The Committee cannot comprehend why it should not be possible to indicate the date of inception of a project. For purposeful planning it is imperative that time-targets setting out dates of inception and probable dates of completion of projects are laid down. All projects should be classified into short-term and long-term ones, and tentative dates for completion should be insisted upon. It should be the responsibility of the Principal Investigator, who works out a particular scheme, to send annual progress reports of the scheme, so as to enable the Director and through him the Standing Fisheries Research Committee to evaluate the progress of the scheme. If a project has to be abandoned, it is desirable that it is discontinued at the earliest possible opportunity to save time and money.
22	3·26	The Committee would suggest that the Indian Council of Agricultural Research may examine all such schemes which have continued or are continuing for more than three years in order to find out whether the results achieved are commensurate with expenditure.
23	3·32	The Committee are glad to note that the Ministry have taken a decision to set up a unit for research on fish farm designing in the Central Inland Fisheries Research Institute, Barrackore. The fish farms not only serve as potential sources for supply of fish by culture practices but also as composite units for demonstration of improved methods of pisciculture and observation centres on breeding of various exotic and indigenous species, their rates of growth, their adaptability to various environmental conditions and their optimum food requirement in different regions of the country under control conditions. Now that State Governments are setting up their own fish farms to augment the production of fish

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		seeds, it is imperative that there is some standardisation in the designing of such farms. The Central Inland Fisheries Research Institute, Barrackpore should, in due course, be in a position to provide guide-lines to the State Departments of Fisheries in the matter of designing fish farms so that economies in construction as well as reduction in the cost of reclamation of water areas could be achieved. The standardised designs prepared by the Institute should be made available to progressive farmers intending to take up fish farming as their profession. The Committee would stress that Fish Farm Designing Unit in the Institute should be set up without any delay.
24	3.49	The Committee are of the view that for any successful implementation of fish culture programme it is of paramount importance that fish seed of the desired species are made readily available in sufficient quantities. Since the production of the fish seed in the country at present is grossly inadequate and cannot meet the demand of even adequately stocking the areas cultivated, the Committee feel that there is an immediate need to make concerted efforts for increasing production of fish seed.
	3.05	The Committee would in this connection like to invite the attention of the Government to the Fish Seed Committee Report, 1966 wherein it has been recommended that the objective of all the States should be to establish at least one centre for induced breeding in each district, with the required complement of nurseries and rearing tanks, within the next ten years. Experimentation to standardise the doses, study of optimum breeding conditions like temperature, oxygen, etc., which are conducted at the Central Inland Fisheries Research Institute, should be statistically designed and the results thereof should be made available within the next two years.
25	3.51	The Committee strongly recommend that States which have already succeeded in induced breeding of carps should intensify their activities in this direction, with a view to enhance the production of seed. In the case of those States which have not yet achieved success, trained extension officers should be sent to demonstrate the techniques.

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26	3·52	As the success of induced breeding of major carps depends on the 'receptivity condition' of the breeders in regard to pituitary hormone injections, the Committee feel that it would be worthwhile to collect information regarding the periods at each centre during which the breeders are likely to react favourably to hormone treatment. This would provide gainful knowledge for achieving success at each centre in the future years. Further thought can then be given as to how best the period of receptivity of the breeders can be prolonged at each of the centres.
27	3·53	The Fish Seed Committee, 1966 have stated in their report that 'adiposity in carps appears to come in the way of the breeders attaining receptivity condition'. The Committee suggest that efforts must be made to determine items of diet that would not lead to accumulation of excessive fat in the breeders.
28	3·54	The Committee understand that experiments on the induced breeding of mullets have already been initiated by the Central Inland Fisheries Research Institute, as well as by the Government of Kerala. They suggest that the work should be continued and experiments to induce *Bhekti* to breed through pituitary hormone administration should also be undertaken by the Central Inland Fisheries Research Institute at an early date.
29	3·55	The Committee understand that work on the induced breeding of Hilsa through pituitary hormone administration has also been recently initiated by the Central Inland Fisheries Research Institute. They suggest that this work should also be continued by the Institute alongside experiments on its suitability for culture in impoundents. The seed thus obtained can also be utilised for stocking rivers where necessary.
30	3·56	The Committee suggest that possibility of establishing a series of pituitary gland 'Banks' may be explored by the Central and State Governments.
31	3·57	The Committee are unhappy to note that about 9,59,487 acres of water areas which are readily available for culture are left unutilised.

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		They strongly recommend that large stretches of cultivable water areas in the country which are at present left unutilised should be brought under cultivation by using the seed procured through induced breeding.
32	3·58	The Committee are concerned to note that economics of induced fish breeding has not been worked out so far by the Central Inland Fisheries Research Institute inspite of the fact that evolution of induced breeding technique is said to be the most significant achievement of the Institute and there is a pressing need for quality fish seed from various States. The Committee hope that no time would be lost in undertaking a study of the relative merits and economics of production of fry through collection from natural sources, pituitary injections and bundh breeding, by the Economic Study Unit that is soon going to be set up in the Institute.
33	3·59	The Committee would like to stress that they attach greater importance to the development and increase in inland fish production by greater exploitation of the fish seeds which are available from the natural waters. They need hardly stress that the collection of fish seed from the natural waters can be increased manifold as at present only 2 per cent of the natural fish seed available in natural waters are caught. Moreover, as already revealed in a study made some time back in Orissa, while the cost of pituitary spawn was Rs. 125 per 50,000 spawns, the cost for riverine collection was only Rs. 20 for the same number. In the circumstances the Committee would urge that Government should encourage as all levels collection exploitation and utilisation of fish seed from the natural waters alongside production of fish seeds by artificial means.
34	3·62	The Committee suggest that productive ponds providing suitable nursery must be selected near all breeding centres rearing the young ones of various species and for maintaining a good stock of breeders.
35	3·64	The Committee cannot too strongly stress the need for coordination and proper dissemination of the results of researches achieved in the various induced breeding centres under

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		the Cetral and State Governments. The Central Inland Fisheries Research Institute should co-ordinate with State Fisheries Departments and collect information regarding the progress of the schemes in various States. It would be useful if the data collected are published in the Annual Report of the Institute.
36	3·77	The Committee attach considerable importance to such items of research as are likely to have a definite impact on the yield of fish. From this stand point, there cannot be two opinions about the need for strengthening research on the introduction of exotic fishes in reservoirs and their culture along with indigenous varieties.
37	3·77	The Committee would like to stress that fish farmers accustomed to grow the traditional fishes have a natural resistance to the introduction of exotic fishes, and it is for the extension staff of the Institute to explain and demonstrate tc fish farmers that exotic fishes like mirror carps, grass carps, etc. do not denude the waters by eating away popular varieties of fishes,
38	3·78	The Committee feel that it is desirable that economics of mixed farming are fully worked out and made known to the State Departments of Fisheries for the benefit of progressive farmers who want to take up mixed farming to augment their income.
39	3·79	The Committee feel that there is a need for acquainting the fish farmers about the harmful effect on the growth of carp fry by the random introduction of Tilapia. The Institute may bring out popular pamphlets to educate the fish farmers about the economics or effects of culture of Tilapia in ponds and reservoirs.
40	3·93	The Committee note that the Central Inland Fisheries Research Institute in conjunction with the State Agricultural Departments has been carrying on investigations on paddy-*cum*-fish culture during the last 12 years and the results achieved so far have not proved to be encouraging. The Committee feel that the Scheme has not been properly conceived and at no time an attempt appears to have been made to work out the econo-

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		mics of the whole project. The Committee are surprised that there is no separate account of expenditure incurred on the project. In view of the fact that the experiment has been going on for a number of years in several States, the expenditure on this infructuous project must be considerable. The Committee suggest that the Indian Council of Agricultural Research may conduct an appraisal of the entire scheme with a view to decide once for all whether the scheme should be continued or abandoned.
41	3·101	The Committee understand that there are vast areas of cultivable brackish waters which are potentially rich resources of fish production and are still unharnessed at present. Barring a few exceptions, there is hardly any information regarding the availability and magnitude of brackish water fish seed in the country. The Committee would suggest that a survey of the areas of cultivable brackish waters may be under-taken by the Ministry in consultation with the State Governments.
42	3·107	The Committee are glad to know that an experimental fish farm is going to be set up at Panna (Madhya Pradesh). They feel that the setting up of this farm would give a much-needed fillip to the development of inland fisheries in Madhya Pradesh and other adjoining States. The Committee hope that the Fish Farm would undertake experiments not only in regard to the known varieties of fishes which thrive in West Bengal and Orissa but also other economic species which can be grown under control conditions in other parts of the country. The Committee would stress the need for the early activisation of the project.
43	3·114	The Committee are glad to note that researches are being conducted by the Institute for the control of weed by chemical and other means so as to preserve fisheries. They would, however, emphasise the need for working out the economics and usefulness of various weedicides so as to recommend them as a standard eradication method for submerged weed.
44	3·114	Alongside experiments on the chemical weedicides, the Committee would suggest that trials may be conducted to see if water-hyacinth and other water weed could be used as compost for agricultural crops or as nutrients for enriching the fish ponds for better production of fish.

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45	3·122	The Committee are glad to note the steps taken by the Central Inland Fisheries Research Institute for combating pests and diseases of culture fishes. They would urge that effective steps may be taken in consultation with the State Governments concerned to popularise among the fish farmers such of the chemicals as have proved effective against the diseases of culture fishes.
46	3·122	The Committee suggest that a programme for training of fish farmers in the application of chemicals, pesticides, etc. in fish culture tanks and ponds may be drawn up in consultation with the State Governments concerned.
47	3·135	The Committee are glad to note that the problems of Chilka Lake, an important fishing centre in the country, have been thoroughly studied by the Chilka Investigation Unit set up by the Central Inland Fisheries Research Institute. The study team has made several useful suggestions to prevent depletion of stock as also to step up fish production. The Committee, however, are surprised that no information appears to be available in the Ministry or the Institute as to the action taken by the State Government on the recommendations made by the Investigation Unit. Fisheries research involves a coordinated effort of both the Central and State Governments. In this particular case, as investigation was undertaken by a study team appointed by a Central Institute, it was but proper for the Ministry to keep in touch with the State Fisheries Departments to find out what follow-up action has been taken in the light of the suggestions made. In any case, the report should have been considered by the Central Board of Fisheries and necessary guide lines given to the State Department of Fisheries as regards the methods to be adopted for preserving the fish stock of the Chilka Lake. Considering the importance of Chilka as a source of fish food and the support that it gives to the industry, the Committee would stress that the Ministry may, in consultation with the State Governments, adopt suitable measures for conservation of the Chilka fisheries.
48	3·140	The Committee regret to note that Government have not been able to create so far a Research

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		Unit on river survey for Brahmaputra recommended to be set up immediately by the Central Board of Fisheries as early as 1965. There has been considerable delay in finalising the matter and some more time is likely to be taken in the construction of the vessel. The Committee feel that the Ministry, once they were convinced about the usefulness of the project, should have proceeded with speed in the matter and assisted the State Government in getting a suitable vessel for survey purposes. The Committee hope that Research Unit on Brahmaputra River Survey would be set up without further delay.
49	3·146	Considering the importance of Hilsa fisheries, the Committee appreciate the steps taken by the Institute to strengthen research and investigations in this direction. The Committee understand that there are vast Hilsa resources in Godavary river and the Andhra Pradesh Fisheries Department has been conducting investigations on Hilsa Fisheries. The Committee would stress the need for coordination of work carried out by the Central and State agencies so as to avoid duplication of researches. The Committee hope that the data collected by the Institute in connection with maturation, breeding season, migration, age, class, sex composition and food habits of Hilsa Fish would be processed and published for the guidance of State Fisheries Departments.
50	3·156	The Committee understand that no large scale production of trout could be effected for want of hatchery and rearing ponds. It continues to be cultured in Kashmir and other places according to methods and techniques introduced in India more than 50 years ago. The Committee are unhappy to note that there has been no significant development of trout fisheries since the inception of Cold Water Fisheries Unit in 1963. No new techniques and methods appear to have been evolved for the culture of such important fisheries as trout, mirror carp, mahseer, etc. The Committee cannot over-emphasise the need for intensive research to provide a scientific basis for the development of trout fishery and other hill fisheries.

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51	3·156	The Committee suggest that the question of improving the fishing methods and introduction of new gear to be used in the trout fisheries in the hilly districts of Punjab, Himachal Pradesh and Kashmir may be actively considered by the Ministry. The assistance of the Central Institute of Fisheries Technology may be sought in the fabrication of suitable fishing gear. The Committee also suggest that vigorous attempts may be made for the development of trout and other high altitude fisheries in hilly areas of Uttar Pradesh, Mysore, Kerala, Haryana and Madras in consultation with the State Governments concerned.
52	3·164	The Committee consider that there is an urgent need for making an intensive study of the pollution of rivers, specially the river Hooghly, by the discharge of factory wastes which are considered to have a deleterious effect on fresh water fishes and specially the Hilsa fish. They also feel that this is a matter which should receive the most careful consideration of the Public Health Irrigation and Fisheries Departments of the State Governments concerned. The Committee strongly feel that the Ministry should take early concerted steps for the setting up of a Water Pollution Board in consultation with the State Governments concerned.
53	3·167	The Committee note the studies conducted by the Fish Spawn Prospecting Teams in surveying the potentiality of various spawn yielding river stretches. They would urge that the conclusions drawn from the surveys may be utilised for proper exploitation of the fishery resources in the rivers which have already been surveyed.
54	3·173	The Committee note that investigations on the feasibility of transplanting desirable species of fish and prawn have already been initiated by the Institute. They would suggest that the results achieved in this direction may be published in the Annual Reports of the Institute. The progress of the scheme may also be closely watched by the Central Fisheries Research Committee or the appropriate Committee of the Indian Council of Agricultural Research.

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55	3·175	The Committee suggest that feasibility of implementing the following recommendations of the Fish Seed Committee may be examined at an early date: "(d) Breeding grounds of major carps should be located and charted out all over the country to enable fuller exploitation of the resources and also to take suitable measures for the protection of breeding grounds. (e) Hitherto, very little efforts have been made to locate centres of availability of seed of brackishwater fishes. Hence, the concerned State Government should make intensive efforts towards exploitation of such resources. The Central Institute may initiate investigations to develop suitable gear for the collection of brackishwater seed."
56	4·10	The Committee attach considerable importance to collection of fisheries statistics and survey of available inland waters so that planned action could be taken to step up resources. They are unhappy that although a decade has passed since the All-India Fisheries Conference adopted a resolution on the subject, no effective steps have been taken by the Ministry for collection of statistics relating to Inland Fisheries on a scientific basis. They would suggest that the Institute of Agricultural Research Statistics of the Indian Council of Agricultural Research may, in conjunction with the National Sample Survey, evolve suitable techniques for conducting surveys from the point of view of estimating total production of fish on an all India basis.
5	4·11	The Committee note that the Institute is also collecting catch statistics from selected rivers and estuaries, but the work has been accorded a low priority. They would suggest that the Institute should co-ordinate their efforts with those of the National Sample Survey so that a methodology may be laid down for a scientific enumeration of fish catches on a country-wide scale.

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58	4.16	The Committee would suggest that the universities having departments of Zoology should be increasingly associated with the institutes of fisheries in general and Central Inland Fisheries Research Institute in particular in the solution of problems of fundamental nature relating to fisheries.
59	4.16	The Committee hope that the Indian Council of Agricultural Research, which gives grants to research institutes and to universities, will farm out certain projects to universities on a continuing basis. Problems of applied nature may be entrusted to the Central Inland Fisheries Research Institute and State Research Institutes for solution.
60	4.19	The Committee are glad to note that sub-stations of the Institute are in close liaison with the Fisheries Departments of the particular States in which the sub-stations are located and that some of the research projects undertaken by the Institute are implemented in collaboration with State Fisheries Departments. The Committee would, however, stress that the Institute should also maintain close and direct liaison with other Research Institutes dealing with fisheries in India and abroad.
61	4.23	While noting the present arrangements for evaluation of the research work by the Director and the Officers-in-Charge of the Sub-stations, the Committee would like to suggest that a periodic evaluation of the work of the Institute may be conducted by an Achievement Audit Committee consisting of specialists. In this connection, the Committee would like to invite the attention of the Ministry to recommendations made by them in para 9 of their 76th Report (Third Lok Sabha) on the Ministry of Food, and Agriculture (Department of Agriculture)—Indian Agricultural Research Institute.
62	4.33	The Committee are unhappy that having set up a chain of extension units for dissemination of results of researches carried out by the Central Fisheries Research Institutes the Ministry considered it necessary to wind them up as a measure of economy. In the opinion of the Committee, this step was retrograde one. Research cannot be

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		carried out in isolation. It is essential that the benefits flowing from research should be made available to the fishermen who require to be enlightened about the latest scientific techniques for the exploitation of fishery resources. The Committee, however, note that the Ministry is contemplating to set up a proper extension machinery on the same lines as agriculture. The Committee hope that the Institute as well as the Indian Council of Agricultural Research would, in cooperation with the State Departments of Agriculture, devise effective machinery to ensure that the results of practical value emerging from the research activities of the Institute are systematically and speedily transmitted to the fish farmers on a more extensive and countrywide scale.
63	4.33	The Committee suggest that the Institute may arrange to publish research results in the form of attractive pamphlets in popular styles and send them to State Governments, Farmers' Organisations and other concerned agencies. Instructional films depicting improved methods and advances in fisheries and the advantages flowing from them should be prepared and widely displayed in rural areas. Arrangements should also be made for giving publicity in improved practices, fishing gear and equipments, etc. at fairs and exhibitions held in the countryside.
64	4.42	The Committee attach considerable importance to periodic meetings of the research workers employed in the Central Inland Fisheries Research Institute as also in the various State Research Institutes for discussion of common problems and exchange of information relating to fisheries research being conducted by them. The Committee suggest that arrangements may be made for holding periodic meetings of the research workers of Central and State Research Institutes in various research stations/sub-stations by rotation.
65	5.5	The Committee note that the training course in the Institute is now controlled by the Director, Central Institute of Fisheries Education, Bombay. The Committee hope that the training would continue to be imparted at Barrackpore so as to meet the special needs of States in the eastern region where a large number of persons trained in inland fisheries is required.

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66	5.17	The Committee are unhappy that the facilities available in the Institute for training in inland fisheries have not been fully utilised. In view of the fact that the number of trainees is coming down from year to year, the Committee suggest that the causes of this downward trend may be thoroughly examined and suitable remedial measures taken in consultation with the State Governments, whose responsibility it is to sponsor candidates for the training course.
67	5.21	Considering the present intake of students, the Committee think that the strength of the teaching staff is adequate. Although the training course has now come under the control of the Central Institute of Fisheries Education, the Committee hope that the research staff of the Central Inland Fisheries Research Institute would continue to deliver lectures on important subjects pertaining to inland fisheries to the trainees.
68	6.3	The Committee feel that some of the reasons indicated for delays in execution of work relating to construction of buildings etc. are such as could have been avoided by better planning and execution. They are, however, glad that steps have now been taken for proper utilisation of the funds.
69	6.6	The Committee note the proposal of the Ministry to allocate funds according to the projects to be undertaken by the Institute. The Committee suggest that alongside project budgeting, the Ministry should also conduct periodically an assessment of the progress made in respect of each project with a view to see whether the monies sanctioned for a project are being well laid out.

APPENDIX XII

Analysis of Conclusions/Recommendations contained in the Report

I. Classification of Recommendations—

A. Recommendations for improving the organisation and working :

Serial Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 24, 25, 26, 27, 28, 29, 30, 31, 34, 35, 36, 37, 39, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 52 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65 and 68.

B. Recommendations for effecting economy :

Serial Nos. 19, 21, 22, 23, 32, 33, 38, 40, 43, 66, 67 and 69.

S. No.	S. No. as per summary of recommendations (Appendix XI)	Particulars
(1)	(2)	(3)
1	19	The Committee have emphasised the importance of taking up research projects which are likely to have a definite impact on fish production and also stressed that before a project is taken up for implementation, the economics thereof should be fully gone into and worked out in detail..
2	21	For purposeful planning it is imperative that time-targets setting out dates of inception and probable dates of completion of projects are laid down. All projects should be classified into short-term and long-term ones, and tentative dates for completion should be insisted upon. The progress should be reviewed annually and if a project has to be abandoned, it is desirable that it is discontinued at the earliest possible opportunity to save time and money.
3	22	The Committee have suggested that the Indian Council of Agricultural Research may

(1)	(2)	(3)
		examine all such schemes which have continued or are continuing for more than three years in order to find out whether the results achieved are commensurate with expenditure.
4	23	The Central Inland Fisheries Research Institute, Barrackpore should, in due course, be in a position to provide guide-lines to the State Departments of Fisheries in the matter of designing fish farms so that economies in construction as well as reduction in the cost of reclamation of water areas could be achieved. The standardised designs prepared by the Institute should be made available to progressive farmers intending to take up fish farming as their profession. The Committee have stressed that Fish Farm Designing Unit in the Institute should be set up without any delay.
5	32	The Committee have pointed out that no time should be lost in undertaking a study the relative merits and economies of production of fry through collection from natural sources, pituitary injections and bundh breeding, by the Economic Study Unit that is soon going to be set up in the Institute.
6	33	The Committee have urged that Government should encourage at all levels collection, exploitation and utilisation of fish seed from the natural waters alongside production of fish seed by artificial means.
7	38	The Committee have suggested that economics of mixed farming should be fuliy worked out and made known to the State Departments of Fisheries for the benefit of progressive farmers who want to take up mixed farming to augment their income.
8	40	The Committee have suggested that the Indian Council of Agricultural Research may conduct an appraisal of the entire scheme of investigations on paddy-cum-fish culture with a view to decide once for all whether the scheme should be continued or abandoned.
9	43	The Committee have emphasised the need for working out the economics and usefulness of

(1)	(2)	(3)
		various weedicides so as to recommend them as a standard eradication method for submerged weed.
10	66	The Committee have suggested that the causes of downward trend in utilising the existing intake capacity may be thoroughly examined and suitable remedial measures taken in consultation with the State Governments, whose responsibility it is to sponsor candidates for the training course.
11	67	Considering the present intake of students, the Committee think that the strength of the teaching staff is adequate and that the research staff of the Central Inland Fisheries Research Institute should continue to deliver lectures on important subjects pertaining to inland fisheries to the trainees.
12	69	The Committee have suggested that alongside project budgeting, the Ministry should also conduct periodically an assessment of the progress made in respect of each project with a view to see whether the monies sanctioned for a project are being well laid out.